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ABSTRACT

The purpose of this handbook is to provide background and guidelines for course designers and instructional developers who will be developing Reserve Component training for the United States military using asynchronous computer conferencing techniques. The recommendations in this report are based on an international review of the literature in distance education and experience gained from developing and conducting Reserve Component training. The handbook is based on a model of remotely conducted, distributed training called the System for Managing Asynchronous Remote Training (SMART). The cornerstones of the SMART model are that training is asynchronous in time, computer mediated, and distributed to soldiers' homes through telephone communications systems. The guidelines are intended to supplement the Systems Approach to Training process, emphasizing the steps course designers must implement or adapt to accommodate conferencing for distributed training. Specific guidelines are given for the Analysis, Design and Development phases; examples and blank worksheets are also included. Sample hardware assembly instructions are appended. (DB)

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Distributed Training for the Reserve Component: Course Conversion and Implementation Guidelines for Computer Conferencing

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FOREWORD

Limited time and wide geographical dispersion of both units and individuals in the National Guard and Army Reserve, i.e., the Reserve Component (RC) make it difficult and costly for soldiers to travel to branch schools for training. Therefore, the RC is exploring alternatives that will use technology to bring training and educational opportunities to the soldiers' homes. One of these alternatives is the creation of remotely conducted classes in which individuals are linked with each other and their instructors asynchronously using computer-mediated communications.

These guidelines are designed to assist training developers who will be designing and developing courses for such distributed, asynchronous, computer-mediated training. The guidelines were developed by the ARI-Boise office within the charter of the Training Technology Field Activity-Gowen Field (TTFA-GF), whose mission is to improve Reserve Component Training effectiveness and efficiency through the testing and application of technology. The research task supporting this mission is entitled "Application of Technology to Meet Reserve Component Needs" and is organized under "Training for Combat Effectiveness" program area. The National Guard Bureau and TRADOC HQ sponsored this project under the Memorandum of Understanding signed 12 June 1985 that established the TTFA-GF. Project results have been briefed to TRADOC HQ, the USA Engineer School, the National Guard Bureau and the Chief, Army Reserve. This Research Product will be used by TRADOC to convert courses for distributed training using computer conferencing techniques.

EDGAR M. JOHNSON
Technical Director

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INTRODUCTION

SMART, a System for Managing Asynchronous Remote Training, is a *concept* for providing remote training to the Reserve Component (RC). Since there are many ways to implement remote training, the guidelines presented in this document are based on using the SMART prototype concept only. Use of the guidelines for other models of implementation will need to be adjusted accordingly. The purpose of this document is twofold:

- To provide course developers with guidelines and context for developing SMART courses in accordance with the SAT (Systems Approach to Training) process.
- To provide course managers with guidelines and context for implementing SMART courses in accordance with the SAT process.

Hence, there are two intended audiences for the document:

- First, the document is intended to be used by contractor or internal (military or civilian) personnel who will be responsible for course development.

  It is expected that these users will:

  – Be familiar with the SAT process.

  – Have previous course development experience.

  – Have a basic understanding of the subject matter of the course being developed.

- Second, the document is also intended for use by contractor or internal personnel who will be responsible for course management.

  It is expected that these users will:

  – Be familiar with the SAT process.

  – Have previous course management experience.

As a result of these expectations, we have defined the scope of the document as follows:

- The document does not include discussion of the basic principles of *all* good instructional design, but is limited to discussion of topics instructional design topics which are particularly pertinent to *remotely delivered training*.
- The document does not include basic principles of the logistics of course administration, but only logistical considerations which are particularly pertinent to remotely delivered training.

ORGANIZATION

For ease of use, the guide is divided into three major sections:

- The first section *(A)* provides *General Information* and overviews of various techniques that can be used in SMART. If you are new to SMART, we suggest that you read this section first.

- The second section *(B)* provides *Recommendations for Analysis, Design, and Development of SMART Courses.* It is intended primarily for use by course developers.

- The third section *(C)* provides *Recommendations for Implementation of SMART Courses.* It is intended primarily for use by course managers.

An overview of the sections is provided on Page 4.

The main index, below, will direct you to the appropriate section. The index at the front of each section will then direct you to the specific topic(s) that make up that section.

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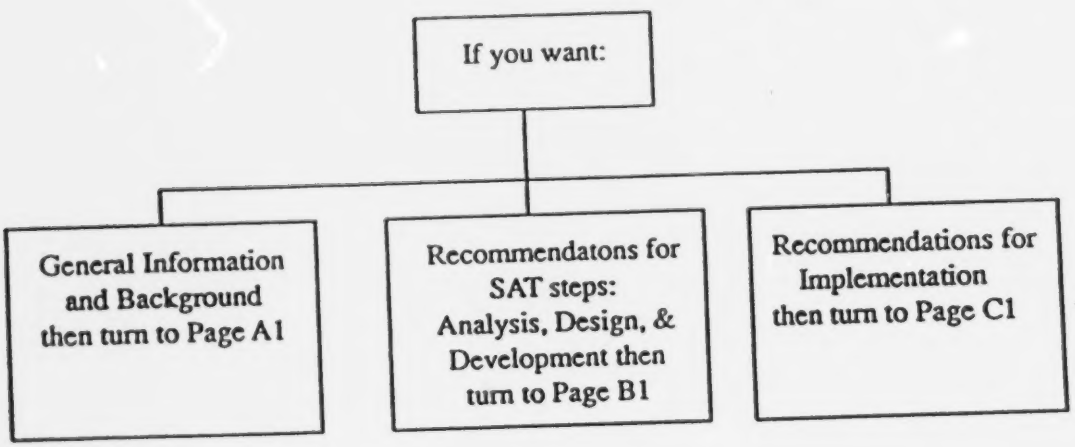
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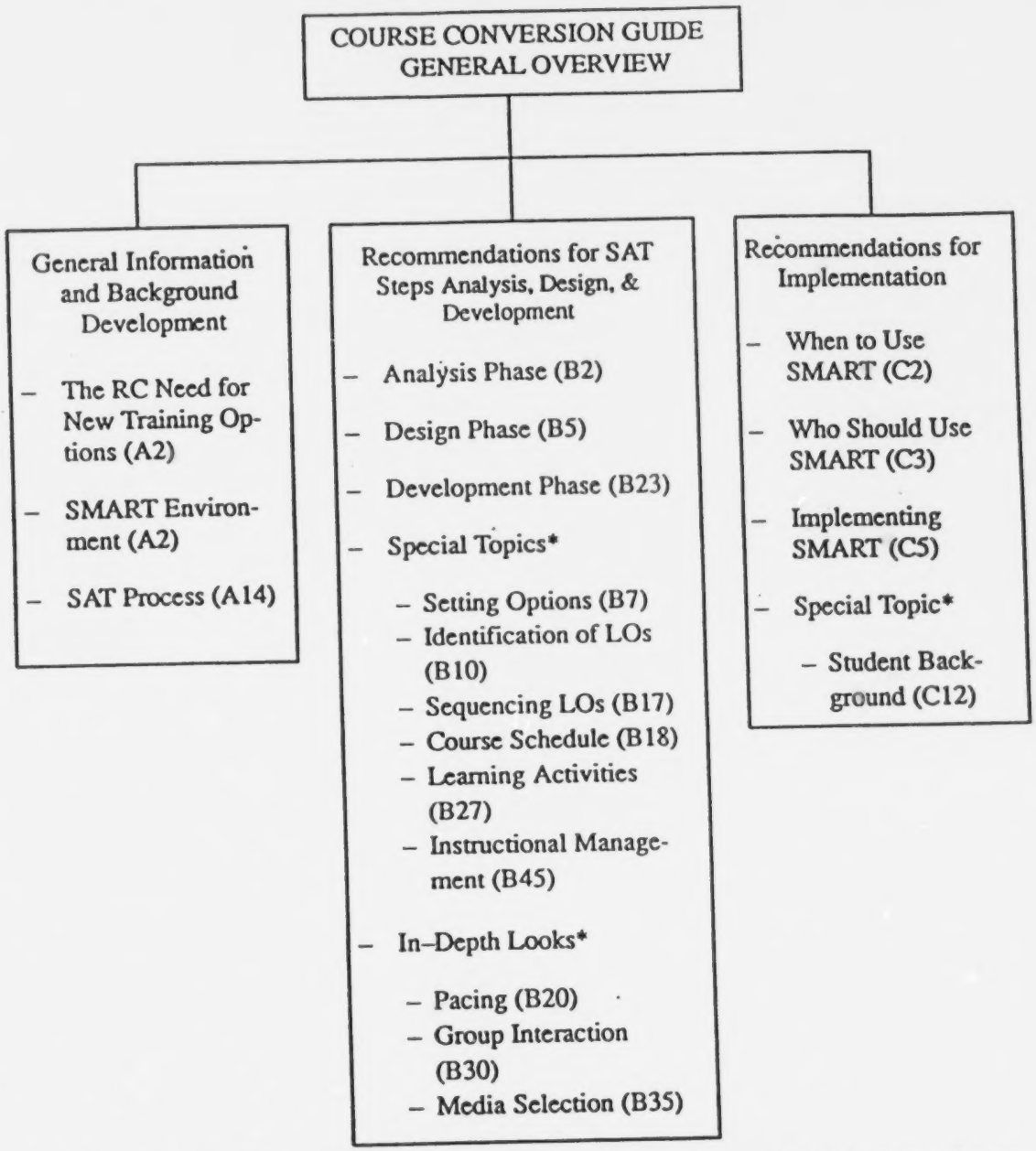
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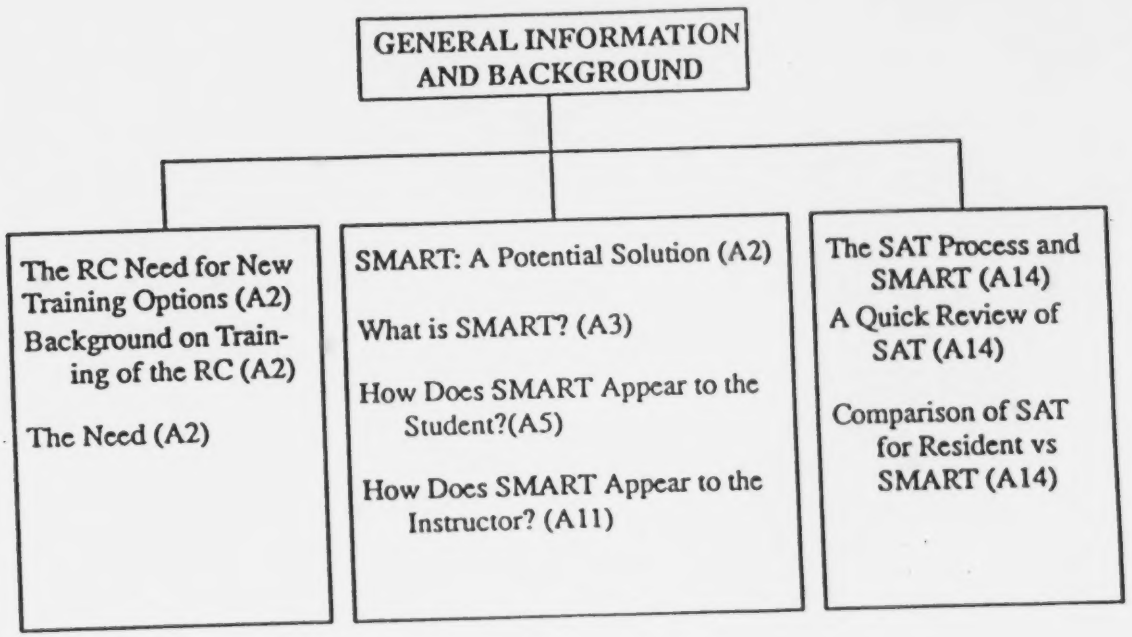
* Special Topics and In–Depth Looks address areas in step–by–step detail that are only mentioned in the main text.

SECTION A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Background on Training of the RC (A2)
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THE RC NEED FOR NEW TRAINING OPTIONS

In its efforts to maintain overall readiness, the U.S. Army is faced with some unique challenges in regard to the readiness of its Reserve Components (RC). The RC is made up of the Army Reserve and the National Guard. Although training is only one important component of readiness, it is many times more difficult to provide adequate training to the RC than to the Active Army, as described below. The importance of adequate training for the RC is acute, however, since the RC makes up more than 50% of the total Army strength.

Background on Training of the RC

Typically, the RC has only 39 training days available per year distributed over 12 weekends and a two week annual training session as compared with the continuous training received by the Active Army.

RC units are scattered all over the United States at more than 4,000 armories and reserve centers. As a result, there are large numbers of soldiers with low geographical density. Low density Military Occupational Specialties (MOSs) often do not justify local courses and, in general, there are not enough qualified instructors within the RC system for all MOSs at all locations.

Travel, then, to resident schools is required, but training for those in the RC must accommodate civilian and personal commitments such as jobs and family responsibilities. Thus, resident training, commonly viewed as the best the Army has to offer, may not be ideal for the RC soldier.

The Need

An ideal training option for the RC would be one that minimizes cost and maximizes quality, throughput, and availability. High quality training that could be delivered at the soldier's home or home armory/reserve center should provide good throughput and acceptance, so would meet this ideal if it were of low cost.

SMART: A POTENTIAL SOLUTION

A potential method of providing such training is through a remotely delivered, computer–mediated training system. We call the system SMART, which stands for the System for Managing Asynchronous Remote Training (SMART). Since it is a new concept, the SMART environment may seem somewhat alien. Many similarities to classroom training are evident and the same objectives can be accomplished but by some different methods.

What is SMART?

SMART is a *distributed* training system. Its functions are to provide a:

- Communication system
- Combination of delivery media, and
- Course management system

and its characteristics are to support:

- Geographically *distributed* training,
- *Asynchronous* and synchronous training, and
- *Computer–mediated* training and communications.

SMART is a *concept* for providing remote training. The specific software and hardware used is not important for understanding and implementing the new concept.

The following paragraphs briefly describe the functions and characteristics of SMART. As is illustrated in Figure 1, SMART provides a *communication system* which allows an instructor to remotely communicate with students, students to communicate with the instructor, and students to communicate with each other, all in a distributed fashion. The major medium of communication in SMART is through the computer which uses existing telephone lines to access a mainframe computer where data are stored. Other names for this kind of communication include asynchronous computer conferencing and computer–mediated communication.

SMART also provides a *combination of delivery media.* All types of instruction can be integrated in SMART training. This instruction includes paper–based materials, computer assisted instruction (CAI), storyboards, formal and informal discussions, problem solving groups, peer tutoring, expert groups, small group exercises, simulations, video– and audiotapes, interactive video disks (IVD), and hands–on activities, which can be accessed via SMART.

Finally, SMART provides a *course management system* which allows the instructor to control and administer lessons, exercises, and tests, while it also automatically maintains rosters, grade books, and attendance records. SMART also allows the instructor to provide feedback on the performance of various activities to students.

The *distributed nature* of SMART allows geographically distributed learners to participate in the instruction without the need to come together in one location. Students and instructional staff can be located anywhere there is access to a telephone. Students can work from their homes, armories, or reserve centers, and instructors can teach from Branch schools, RF schools, or their homes. With portable computers, students and instructors can continue their participation in classes even when they travel.

Computerized means for soldiers and instructors to communicate asynchronously from distributed locations.

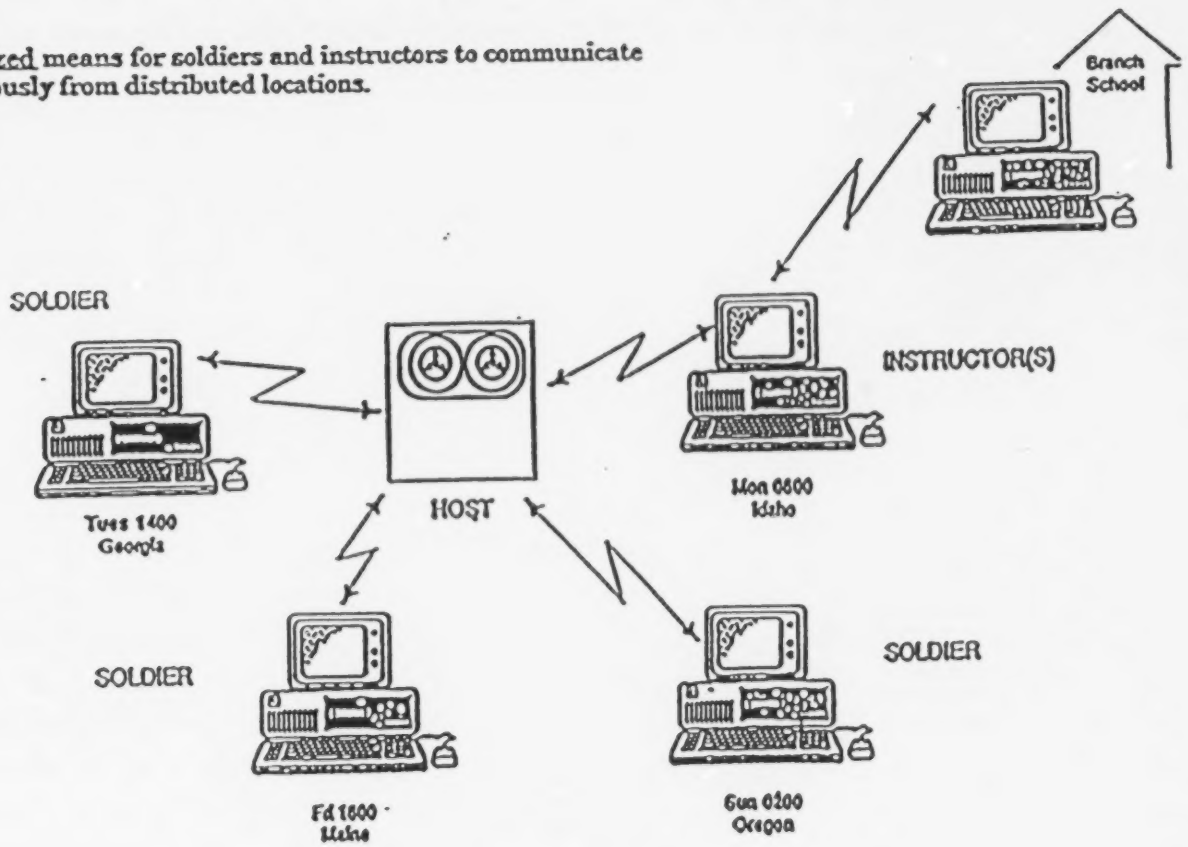
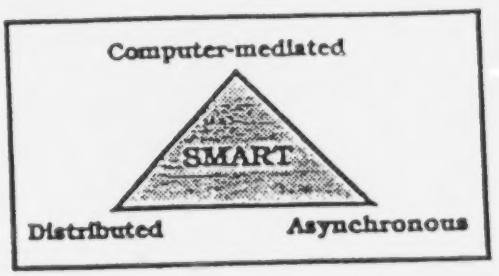


Figure 1. The SMART Communication Network.

Most of the instruction delivered via SMART is accessed *asynchronously*. That is, not everyone must participate at the same time. This flexibility of scheduling makes SMART quite adaptive to personal time constraints. However, it also means that there are built–in time delays before all students receive the instruction and that certain activities, such as group discussions, will take longer than they would in the face–to–face environment. When time delays are not practical, SMART allows *synchronous* communication. Here, all students access SMART at one time and work together to accomplish a given task. When the task is completed, students return to the asynchronous mode.

Since SMART is *computer–mediated*, it requires that each participant have: a computer with a modem (a device that allows computer communication over the telephone); appropriate software to facilitate computer communication and learning activities, telephone links, a host computer which supports uploading (transmitting information to someone) and downloading (receiving information); and a certain amount of computer expertise. The system facilitates meaningful, connected discussions by a group of students. These discussions take place on the computer as students read and comment on input from each other. This distributed training system also allows instructors and schools to take advantage of the fact that every student has a computer which facilitates the use of computer–based training.

SMART is many things. Perhaps the three most important features of SMART, however, are that it is *distributed*, predominantly *asynchronous*, and *computer–mediated*.



How Does SMART Appear to the Student?

As in some other distributed learning situations, like correspondence, students who learn via SMART experience a tabletop learning environment—they most likely sit at the kitchen table or at a desk in their homes and work alone in the sense that there are no other students physically present. Since they are RC, they fit their training around their daily routines. Students also work on very different schedules. All these factors combine to make the SMART learning experience quite different from that of a student who takes a resident course. Figure 2 depicts segments of a "day in the life" of a

Resident Student	SMART Student	Notes
Monday		
0700 Wakes up and a takes shower	Drives to work	The resident student is able to devote the entire day to course work; the SMART student devotes more than a third of the day to civilian employment
0800 Reports to the first lecture of the day	Arrives at the office and begins the work day	
0930 Takes a break and chats with other students	Tries to reach a classmate by phone; no luck	
0945 Begins a small group exchange	Gets work assignment to write a major report by Friday	The resident student has face–to–face interaction with classmates so group exercises are accomplished quickly in a pre–scheduled time period; the SMART student must coordinate group work and add administrative time to the activity
1145 Finishes the small group exercise; breaks for lunch	Classmate returns call; spends 20 minutes scheduling a synchronous meeting for Friday	
1300 Completes a CAI lesson at the computer lab	Eats lunch at desk while doing a SMART reading assignment	
1400 Goes to lecture	Resumes office work	
1700 Returns to quarters	Drives back home	
1800 Has dinner with classmates	Has dinner with family	
1930 Does a homework assignment	Checks kids' homework	
2030 Watches Monday Night Football	Works on SMART—does a CAI and a paper–based exercise	Only after fulfilling civilian job and family requirements can the SMART student work on the course
2330 Goes to bed	Goes to bed	

Figure 2. A day in the life of a resident and a SMART student.

resident student and a SMART student and highlights the differences between the two.

For the resident student, one day is very much like another, with course requirements allocated to scheduled time blocks and with few pressing distractions from course work. For the SMART student, however, this is not the case. Each day brings different challenges to overcome in order to complete course requirements. Figure 3 shows typical segments of a "week in the life" of a SMART student.

Once working in SMART, one experiences a very different milieu from the face–to–face classroom. To illustrate this, Figure 4 shows what the SMART student may see and do during the computer session that takes place at 2030 hours on Thursday.

Note that, in the discussion of SMART, the features described are unique to our software implementation. In other implementations, one would expect SMART to perform similar functions, but the particular features may look different. The following explanation corresponds to the three sections (A, B, and C) in Figure 4.

(A) The first thing students see after turning on the computer is an analog of an electronic school. This school contains "rooms" or places where various activities occur—feedback on tests is given in the office; small group activities take place in the team room; class discussions take place in the classroom; general chit–chat takes place in the break room; self–contained lessons, such as CAIs and storyboards, are taken in the learning center; and homework assignments and tests are done in the writing center. The school metaphor serves as an aid to understanding the learning environment for the students who are moving from the known world of the face–to–face classroom to the unknown world of SMART.

(B) The task list serves as an organizer, whereby students select activities to perform. In addition to selecting self–contained course requirements, such as performing a CAI, they may elect to send or receive information to/from other students and/or the instructor. This is done by "uploading" or "downloading" to/from the host computer. The task list also serves a course management function by keeping track of what lesson activities they still need to complete.

(C) Students would probably first elect to download information from the host computer. By downloading, they would receive answers to any questions they might have posed to the instructor, messages from classmates, and feedback on graded activities already completed. Only that information sent to the host computer since they last downloaded is provided. Information is organized hierarchically by net, item, response, and date. Before continuing through our overview of the SMART session, an explanation of these concepts is in order.

SMART Student	Notes
Tuesday 1900 Reports to RC unit for weekly meeting 2330 Returns from meeting and goes to bed	In addition to juggling family and civilian job requirements, the SMART student must perform RC military duties
Wednesday 0900 Gets phone call about a meeting to attend tomorrow; requires travel across the state 1700 Returns home to pack; puts a message online to classmates regarding unexpected trip	SMART students often have unexpected events in their lives (such as overtime, travel, or sickness) which prevent them from working on course requirements for one or more days
Thursday 1830 Returns home from meeting; eats dinner with family 2030 Starts working in SMART—downloads, reads through downloaded information and types replies, does a CAI, uploads messages and CAI answers, organizes information	Working in SMART implies more than just completing a lesson; there are administrative duties such as organizing information and computer communications tasks
Friday 1800 Gets online to begin synchronous meeting 1830 All classmates are ready to begin the group exercise; the instructor hands out the assignment 2200 Sends answer to group assignment to instructor and goes offline	Group activities that take place with ease in a face–to–face setting may require a great deal of coordination when conducted via computer; in synchronous meetings, all group members must be on the computer at the same time; even in synchronous meetings, there is a time delay while students respond to one another so the same activity takes longer using computers than face–to–face
Saturday 0800 Goes on all day family outing	
Sunday 1900 Goes online to ask a question during online office hours	Instructor hours must accommodate students' schedules

Figure 3. A week in the life of a SMART student.

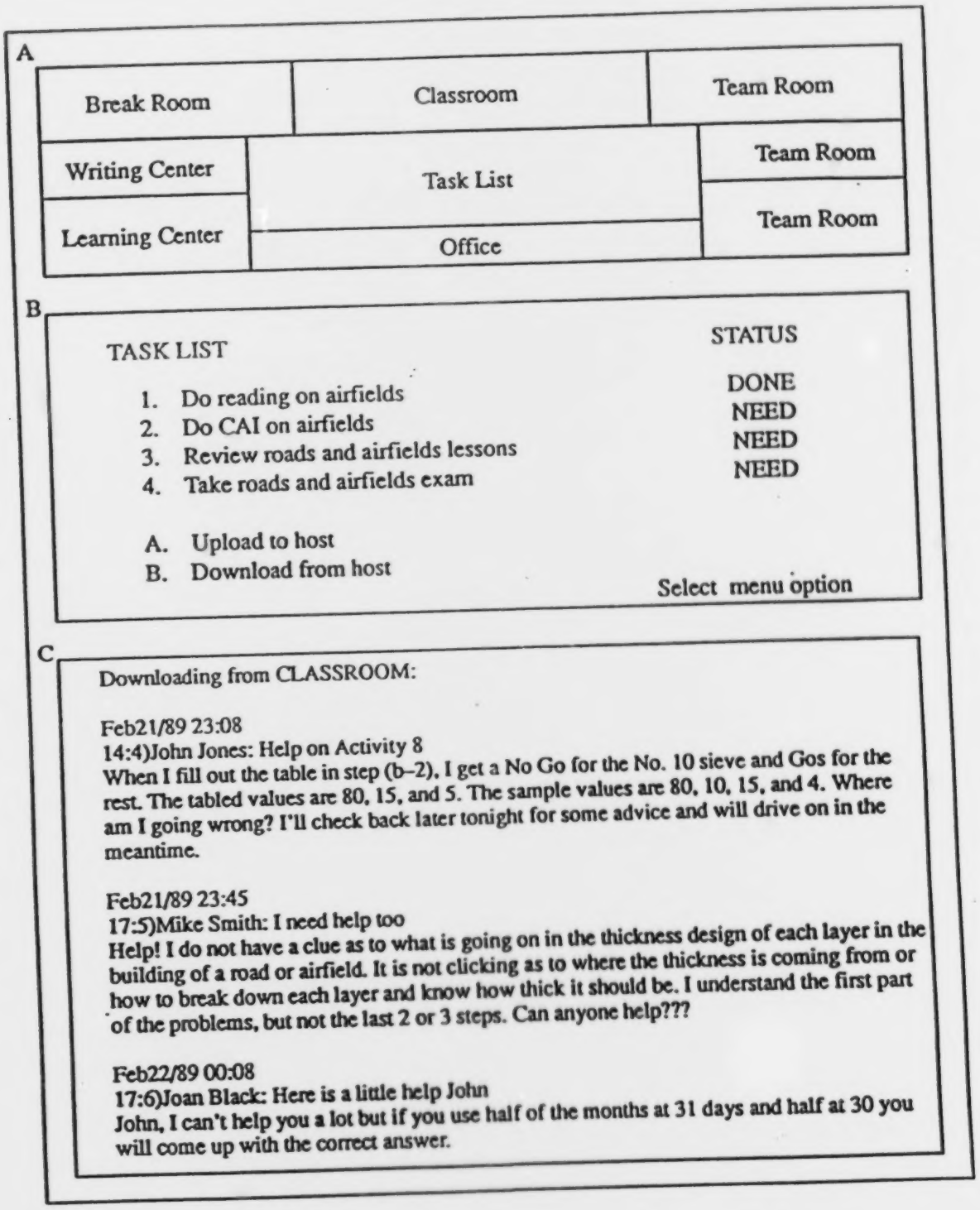

A
Break Room
Classroom
Team Room
Writing Center
Task List
Team Room
Learning Center
Office
Team Room
B
TASK LIST
STATUS
1. Do reading on airfields
DONE
2. Do CAI on airfields
NEED
3. Review roads and airfields lessons
NEED
4. Take roads and airfields exam
NEED
A. Upload to host
B. Download from host
Select menu option
C
Downloading from CLASSROOM:
Feb21/89 23:08
14:4)John Jones: Help on Activity 8
When I fill out the table in step (b–2), I get a No Go for the No. 10 sieve and Gos for the rest. The tabled values are 80, 15, and 5. The sample values are 80, 10, 15, and 4. Where am I going wrong? I'll check back later tonight for some advice and will drive on in the meantime.
Feb21/89 23:45
17:5)Mike Smith: I need help too
Help! I do not have a clue as to what is going on in the thickness design of each layer in the building of a road or airfield. It is not clicking as to where the thickness is coming from or how to break down each layer and know how thick it should be. I understand the first part of the problems, but not the last 2 or 3 steps. Can anyone help???
Feb22/89 00:08
17:6)Joan Black: Here is a little help John
John, I can't help you a lot but if you use half of the months at 31 days and half at 30 you will come up with the correct answer.

Figure 4. Sample SMART session.

A *net* is the computer equivalent of a room in the electronic school where activities take place. Information from similar types of activities are stored together in a net. For example, in our SMART implementation shown in Figure 4 (C), the net is the CLASSROOM. This is where discussions about technical topics take place. As can be seen from the figure, students are asking questions about course content.

An *item* is a statement or discussion about a single subject or thought. In Figure 4 (C), you will note *designators* such as 14:4 and 17:5. The number to the left of the colon is an item number which keys to the item being discussed. In the example, Item 14 is a technical discussion on Road Design, while Item 17 is a technical discussion on Airfield Design. In the designators, the number to the right of the colon is a response number. A *response* is a comment about an item or another response. Responses are displayed in the order in which they are received, as indicated by the date and time stamps shown in Figure 4 (C).

The excerpts shown in Figure 4 (C) are transcripts from a real class, with only the names changed. They represent a portion of the student–to–student dialogue taking place in about a one–hour period on a given evening. Several features of the transcript are noteworthy:

- Time stamps—as was stated previously, SMART students do most of their course work during evening and weekend hours; the time stamps reflect Eastern time; "John Jones," a student who lives in Maryland, was working on the course at 11 p.m.;

- Organization—because students are working asynchronously, and even though responses 17:5 and 17:6 follow one another chronologically, they do not follow logically; response 17:6 obviously is a response to a comment posted at some time previous to 17:5; further, not all students are working on the same course topics, as evidenced by activity in two items which do not refer to the same content areas. The result of this is that students must devote time and effort to organizing downloaded information into a logical (i.e., by item) sequence, usually by printing the information and binding it in a notebook; and

- Peer learning—these items are being used by the students to ask and answer technical questions. While the instructor would have the ultimate responsibility of answering technical questions, he or she is not the only resource available to the student with a question, as evidenced by "Joan Black's" response. Unlike the face–to–face environment, where it is usual for the instructor to speak and the student to listen, computer conferencing affords equal air time to all and

soldiers are free to respond to one another in any public discussion.

Figure 5 represents a snapshot of the student's remaining tasks as presented in a SMART session.

(A) SMART prompts for comments on items and responses just read. SMART transforms the entry into language understandable by the conferencing system, so the student does not have to learn the peculiarities of a particular conferencing system. Finally, SMART returns the student to the task list after downloading and responding is completed.

(B) The next task selected is performing a CAI lesson. Our SMART software automatically finds and displays the correct lesson. As the student moves through the lesson, information is presented and questions are asked. When a question is answered, immediate feedback is given regarding correctness. Serving its function as a course management system, our version of SMART stores the student's answers and automatically sends them to the instructor when the student next selects the upload function from the task list. In fact, selecting the upload function causes all newly created data, such as the responses shown in Figure 5 (A) and answers to CAIs and quizzes, to be automatically transmitted to the host computer in the format required by the conferencing system. Typically, the student would upload after completing all other computer–mediated activities during a particular session.

How Does SMART Appear to the Instructor?

The fact that SMART is characterized by being distributed, asynchronous, computer–mediated training and communication also impacts the SMART instructor with respect to both work schedule and duties performed. The emphasis on computer mediation and independent learning shifts the emphasis of the role of the instructor from primarily that of a deliverer of instruction to one of a manager/facilitator and a counselor. That is, the SMART instructor spends less time *providing* course content via lecturing or other classroom techniques than does the resident instructor and more time *guiding* students through the learning experience by directing their studies, answering questions, and providing performance feedback.

Figure 6 gives highlights of a "week in the life" of a SMART instructor. For the purposes of the illustration, it is assumed that the instructor works full time teaching one course. Note that, although the instructor works for 40 hours during the week, time is allocated according to student needs rather than as an eight to five workday. Further, to ensure timely feedback to students, it is necessary for the instructor to check in on the computer on at least a daily basis.

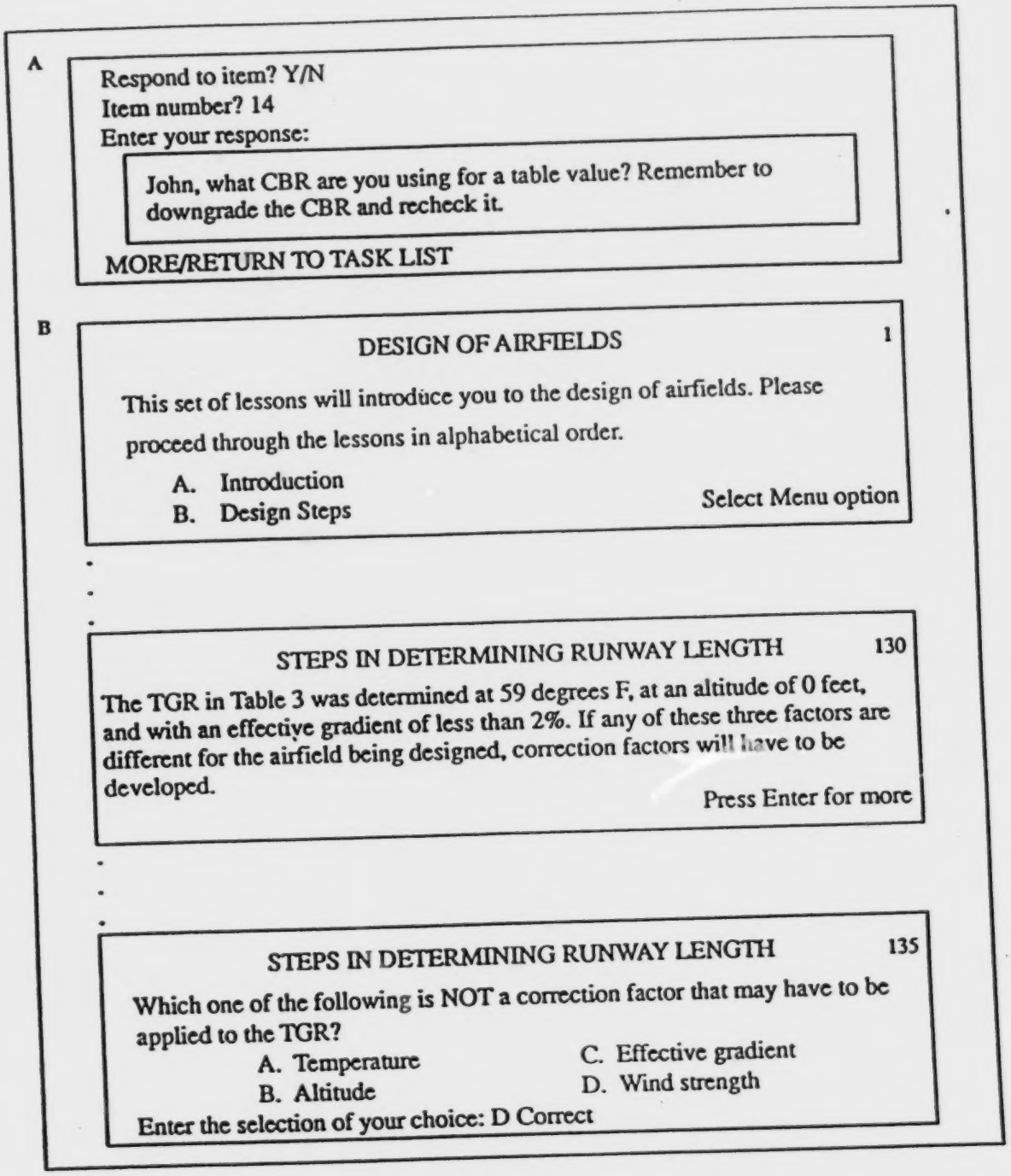

A
Respond to item? Y/N
Item number? 14
Enter your response:
John, what CBR are you using for a table value? Remember to downgrade the CBR and recheck it.
MORE/RETURN TO TASK LIST
B
DESIGN OF AIRFIELDS 1
This set of lessons will introduce you to the design of airfields. Please proceed through the lessons in alphabetical order.
A. Introduction
B. Design Steps
Select Menu option
STEPS IN DETERMINING RUNWAY LENGTH 130
The TGR in Table 3 was determined at 59 degrees F, at an altitude of 0 feet, and with an effective gradient of less than 2%. If any of these three factors are different for the airfield being designed, correction factors will have to be developed.
Press Enter for more
STEPS IN DETERMINING RUNWAY LENGTH 135
Which one of the following is NOT a correction factor that may have to be applied to the TGR?
A. Temperature
B. Altitude
C. Effective gradient
D. Wind strength
Enter the selection of your choice: D Correct

Figure 5. Continuation of sample SMART session.

SMART Instructor		Notes
Monday		
0800–1100	Goes offline to receive messages and grades on activities, writes replies and feedback and uploads (download/upload)	Like the student, the instructor accesses the SMART via the task list; he or she is able to see grades on activities that are scored automatically, pick up assignments to grade, post grades, receive questions and comments and post answers to them; students who are not getting online, either because they have fallen behind or because they are having computer problems, must be contacted by phone.
1100–1500	Updates records of student progress; phones students who have fallen behind	
1500–1700	Takes hotline call from a student having software problems; sends new disks	
Tuesday		
0800–1000	Downloads/uploads	
1000–1100	Obtains clarification from proponent school on topics students have questions about	In SMART, the instructor has the opportunity to consult with other experts or with written resources before answering a question.
Wednesday		
0800–1100	Downloads/uploads	
Thursday		
0800–1200	Downloads/uploads	
1200–1600	Grades exams and homework	The time needed for downloading and uploading will vary by volume.
Friday		
0800–1100	Downloads/uploads	
1200–1400	Adds funds to computer accounts	
1800	Goes online for synchronous meeting	SMART instructors do both class admin (grading, etc.) and computer admin tasks.
1830–2200	All students are ready to begin the group exercise; gives the assignment and monitors progress	Synchronous activities must be scheduled around the students other activities.
2200–2300	Grades group assignment and puts feedback online	Prompt feedback is critical in SMART.
Saturday		
0800–1100	Downloads/uploads	To ensure timely turnaround instructors must be on the computer daily.
Sunday		
0800–1100	Downloads/uploads	
1900–2100	Goes online for office hours	

Figure 6. A week in the life of a SMART instructor.

THE SAT PROCESS AND SMART

This section describes how SMART incorporates the SAT process. We will begin with a brief review of SAT.

A Quick Review of the SAT Process

SAT is a five–part process which comprises the following phases:

Analysis. The Army refers to this phase as collective front end analysis (CFEA).

The five basic steps are to: analyze the job, select task functions, construct job performance measures, analyze existing courses, and select the instructional setting. The intended result of Analysis is an inventory of critical tasks, task conditions, and standards of performance.

Design. This phase consists of four steps which will build the training program based on the requirements of the job.

The first step is the conversion of each task into an objective. Tests are then designed to match the objectives. Student entry behavior is then described and, finally, a sequence of instruction is designed for the objectives.

Develop. This phase is a five step process in which learning materials are developed and tested.

The first step is the specification of learning activities which will satisfy the objectives determined previously. Next, instructional management plans are developed to allocate resources needed for conducting the instruction. Then, existing materials are reviewed to determine their adequacy for teaching to the objectives. Where suitable materials are not already available, instruction is developed. Finally, the course plan is validated.

Implement. The instructional management plan is implemented and instruction begins.

Evaluate. Both internal and external evaluation are conducted by the Directorate of Evaluation and Standards (DOES).

Comparison of the SAT Process for Resident vs SMART Courses

Examination of the SAT phases indicates that there are no differences in Steps 1 – 3 of the Analysis phase or in any steps of the Evaluation phase for SMART and resident courses. Hence, these steps will not be discussed further.

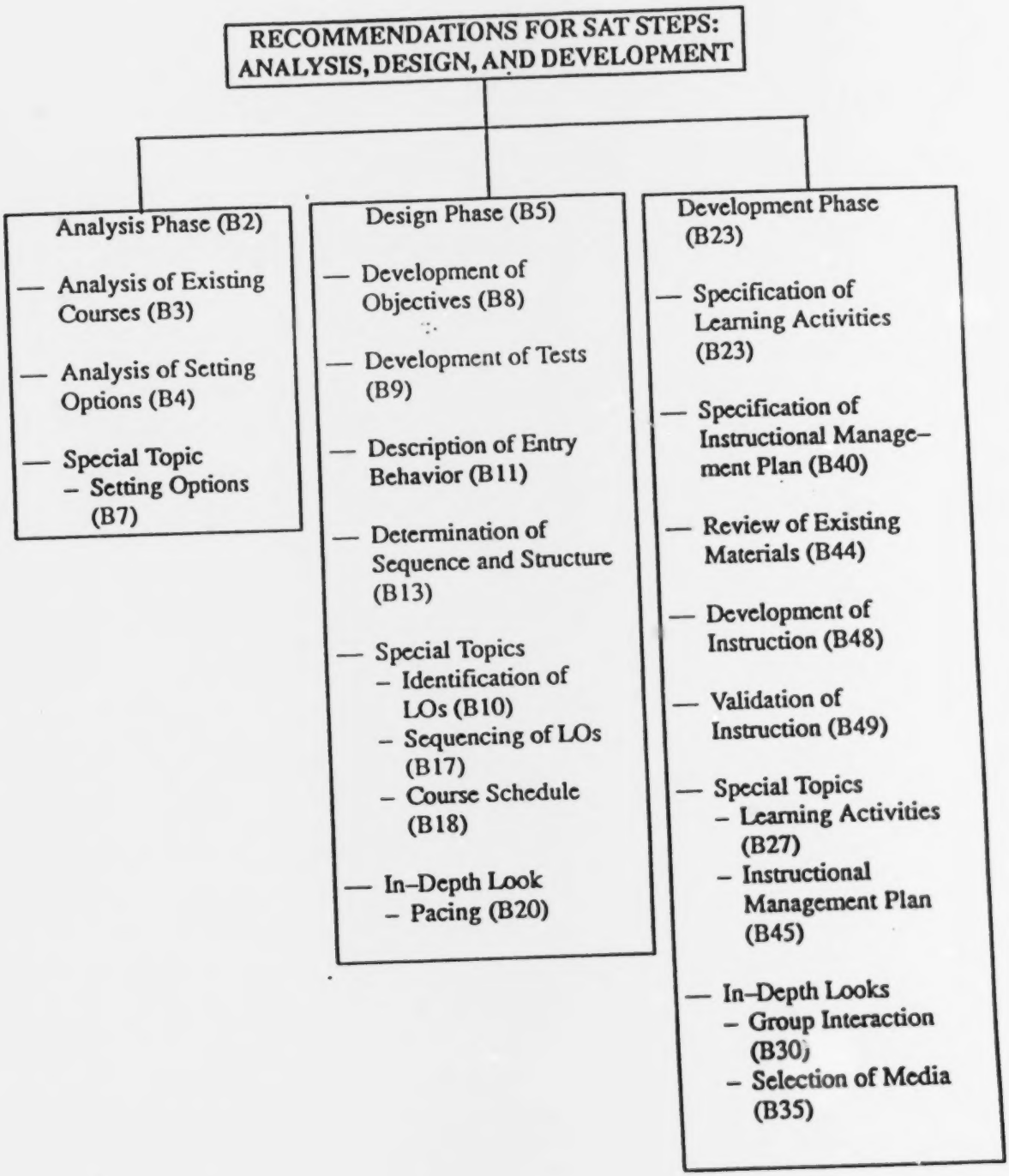
Analysis, Design, Development, and Implementation involve considerations in SMART in addition to those for resident programs. Resident and SMART programs differ in a number of ways. In SMART, there is no face–to–face contact. Further, SMART is largely asynchronous; it allows a great deal of student autonomy, and it caters to part–time students.

These differences impact efforts in Analysis, Design, Development, and Implementation. For example, the unavailability of nonverbal cues due to the lack of face–to–face contact in the SMART environment argues the need for frequent testing and feedback and the use of telephone and/or mail communications for student support. The asynchronous aspect of SMART argues the need for individual activities, but group pacing. Student autonomy and awareness of the requirements of part–time students argue the need for flexibility of completion of activities and deadlines.

The remainder of this document will detail requirements in the application of the SAT process for the SMART environment. In all cases, these same steps are also being performed in the Resident environment. However, we will want to emphasize certain aspects of the step and how those aspects may change, or become of increased importance, in SMART. Section B discusses the Analysis, Design, and Development phases of SAT. Section C discusses the Implementation phase of SAT.

It should be noted that SAT is not a linear process. Rather, output of a given step often feeds back to previous steps as well as forward to subsequent steps. Feedback loops are noted throughout the document.

SECTION B


RECOMMENDATIONS FOR SAT STEPS: ANALYSIS, DESIGN, AND DEVELOPMENT
Analysis Phase (B2)
— Analysis of Existing Courses (B3)
— Analysis of Setting Options (B4)
— Special Topic
– Setting Options (B7)
Design Phase (B5)
— Development of Objectives (B8)
— Development of Tests (B9)
— Description of Entry Behavior (B11)
— Determination of Sequence and Structure (B13)
— Special Topics
– Identification of LOs (B10)
– Sequencing of LOs (B17)
– Course Schedule (B18)
— In–Depth Look
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Development Phase (B23)
— Specification of Learning Activities (B23)
— Specification of Instructional Manage–ment Plan (B40)
— Review of Existing Materials (B44)
— Development of Instruction (B48)
— Validation of Instruction (B49)
— Special Topics
– Learning Activities (B27)
– Instructional Management Plan (B45)
— In–Depth Looks
– Group Interaction (B30)
– Selection of Media (B35)

RECOMMENDATIONS FOR SAT STEPS: ANALYSIS, DESIGN, AND DEVELOPMENT OF SMART COURSES

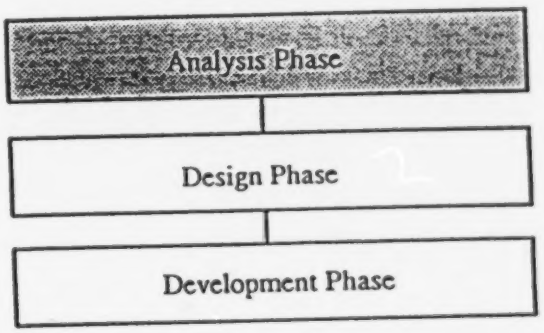
Although good course design is critical in any training effort, it assumes additional importance in the SMART environment, particularly when non–verbal cues showing that a student does not understand the course content are absent. Course materials should be designed so they can be easily understood in a stand–alone format wherever possible. They must provide diagnosis for the instructor and feedback for the student. Further, the course designer must keep in mind the needs of the part–time reserve soldier with respect to time demands and motivational factors.

In a discussion of course design, it can be assumed that the developer is working from a course that is already in existence in resident format "converting" that course to a SMART implementation. It can also be assumed that the developer has access to the POI and all lesson materials, including all written materials, lectures, exams, exam results, and exam keys.

The expected level of effort is a conversion from existing materials, with a change in media and the addition of new instructional activities where necessary. It is expected that neither the structure or basic content of the lessons nor the lesson objectives (for existing lessons) will be changed.

Developers who are working "from scratch" and developing a new course that has not been taught in resident school, will have to apply the SAT process as written, and use this document as a source of pointers for aspects of SAT that need particular emphasis in the SMART environment.

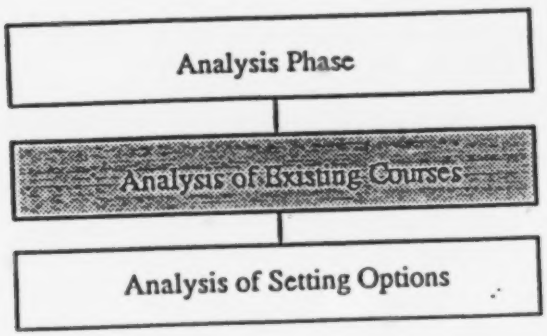
A. ANALYSIS PHASE



As mentioned previously, the first three steps of the analysis phase, job analysis, selection of task functions, and construction of job performance measures, are the same in the SMART environment as in residence. In fact, these steps need not be repeated if they have already been performed for the resident course.

Analysis for SMART conversion focuses on the analysis of existing courses and the selection of the instructional setting.

A1. ANALYSIS OF EXISTING COURSES



The purpose of this step is to look for the features of the resident course that will be most and least easily incorporated into the SMART environment and to gain perspective/familiarity with the course. It is assumed that the course under study is one that has been designated to be taught in the SMART environment, and that it is *not* the course designer's responsibility to decide whether or not a particular course (or portions thereof) is to be implemented in SMART.

Perhaps the best way to become familiar with an existing course is to attend the course yourself, preferably as a participant rather than as an observer. If this is not possible, the next best way to get in depth familiarization is to study the available lesson materials and to consult with SMEs (subject matter experts).

Remember, the purpose of this stage is *familiarization*, not concrete decision–making about the design process. As you familiarize yourself with the course, ask yourself the following questions:

— Do I have everything I need to complete the course requirements? Does the school use materials that I do not have?

It is critical to have a complete set of materials for course design.

— Are there things that I don't understand about the course content? Did some topics seem to be very difficult? Did my classmates seem to do poorly on some learning activities?

If you answered "yes" to the above questions, note which activities were seen as difficult by yourself and others. These will need careful attention in the SMART environment.

— Did you get any "gut reactions" like "That lecture would make a great CAI!" or "We could film that instructor and show our students the lesson on video!"?

While there are a good many principles of course design that have been derived from research, it is still true that there is a certain "art" to course design. Hunches may prove invaluable in your determination of the instructional setting.

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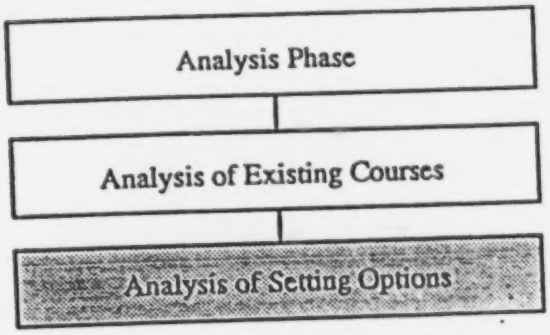
A2. ANALYSIS OF SETTING OPTIONS



> CAUTION: While it is tempting to adopt all resident CAIs as primary instruction in SMART, be aware that many of the CAIs used in resident programs are intended to reinforce points made in lecture. They do not take the place of lecture in face–to–face instruction and should not take its place in SMART. Rather, they should also be used in a supplemental role in SMART.

The purpose of this step is to begin to identify the settings or media inside the SMART environment where particular activities will be taught.

Several options are available. First, the material can be taught as–is if it already exists in a medium accommodated by the SMART environment. For example, if a PLATO CAI is used at the resident school, it may also be usable in SMART if student access to a mainframe which supports PLATO can be provided or if the lesson is available in micro form. Also, films shown at the resident school can be packaged in video form and sent to students to be viewed on VCRs. Obviously, the use of existing materials is more cost–effective (because it is less labor intensive) than other alternatives.

If materials do not exist in a medium accommodated by SMART, they must be converted to a medium which can be implemented in the SMART environment. The prime example of this situation occurs in the case of live lectures, which obviously cannot be delivered in the same format in SMART. The content of these lectures can be recast in the form of written materials, CAIs, storyboards, or video– or audio–tapes, to name a few. (See more suggestions for conversion media in the Special Topic on Setting Options.)

In some cases it may not be possible or desirable to convert material to a medium accommodated by SMART. In such cases, alternate plans are needed. One such case would be a field trip held in resident training. In this situation, it may be necessary to make arrangements for SMART students to have the same or a similar field experience. Another case would be the use of IVD (interactive video–disk) learning activities in resident training. At this point in time, it would not be cost–effective to provide IVD equipment to each student for in–home use. Here, you might design an activity in which

the student must go to the nearest reserve center for the IVD training.

It is important to remember that the output of the analysis of setting options is the identification of possible media for each lesson activity. The output is *not* a final decision on the medium for any *particular* lesson. This decision will be made later in the SAT process.

> CAUTION: Students must have convenient access to materials or they will not be successful in the remote training setting. Out–of–home activities, while possible in the SMART environment, should be avoided unless they are the only practical alternative.

Figure 7 is a sample worksheet that you might find useful in conducting your analysis of setting options. (Blank worksheets can be found at the end of this section.) It calls for the following information:

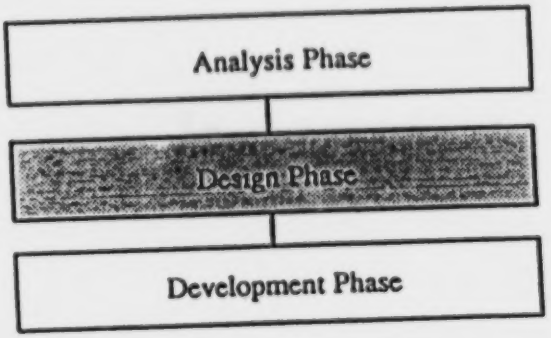
— A description of each learning activity as it is currently performed at the resident school.

— A decision as to whether the activity can be used as–is, can be converted for in–home use, or must be taught out of the home.

— A list of possible in–home media, if conversion is the option of choice, along with a short justification of your preferences for certain media.

— A description of possible out–of–home arrangements, if teaching out of the home is the option of choice.

B. DESIGN PHASE



All aspects of the Design Phase must receive special attention in course development for the SMART environment.

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Description of Learning Activity at Resident School:

The learning activity is a three hour lecture which covers an overview of asphalt plants and asphalt paving operations, aggregate blending, determination of the optimum asphalt content, and estimation of a bill of materials.

In the overview section, the instructor used a large number of overheads. Aggregate blending, determination of the optimum asphalt content, and estimation of the bill of materials were taught in a lead–through practical exercise format. Aggregate blending is an iterative calculation.

Analysis of Setting Options:

_____ Materials suitable as–is

__x__ Materials suitable for conversion

_____ Materials must be taught out of the home

Most Suitable Conversion Options (if applicable):

__x__	Offline written material	__x__	Videotape
_____	Online written material	_____	Online discussion
__x__	CAI	_____	Group exercise
__x__	Storyboard	_____	Hands–on experience
__x__	Workbook/notetaking guide	_____	Simulation or game
_____	Audiotape	_____	TV or radio broadcast
__x__	Spreadsheet exercise	__x__	Paper–based exercise

Notes on Conversion Options:

Since the overview section has a large visual component, the best media are those which accommodate visuals: e.g., offline written material with graphics, or storyboards or videotapes with notetaking guides (so that hard copy information is available to the student for future study).

For the lead–through practical exercises, media which can provide feedback regarding correctness of answers during the exercise are most suitable: e.g., CAIs or offline written materials in a programmed instruction format. CAIs would be accompanied by workbooks so that the student would have hard copy materials to refer to for exams, etc. Use of a spreadsheet would ease the calculational burden on the student for the aggregate blend.

Description of Out of Home Teaching Methods (if applicable):

Figure 7. Setting options analysis worksheet.

SPECIAL TOPIC ON SETTING OPTIONS: What are my setting options in converting existing materials for use in SMART?

The following is a list of instructional methods which can be used in the home in the SMART environment:

- Offline written materials, including TMs and FMs
- Online written materials placed in the computer conference
- CAIs, both mainframe and micro versions
- Storyboards
- Workbooks and notetaking guides
- Audiotapes
- Videotapes
- Online discussions
- Group exercises, both synchronous and asynchronous
- Small scale hands–on experiences
- Simulations and games
- Television and radio broadcasts
- Spreadsheet or paper–based calculational exercises.

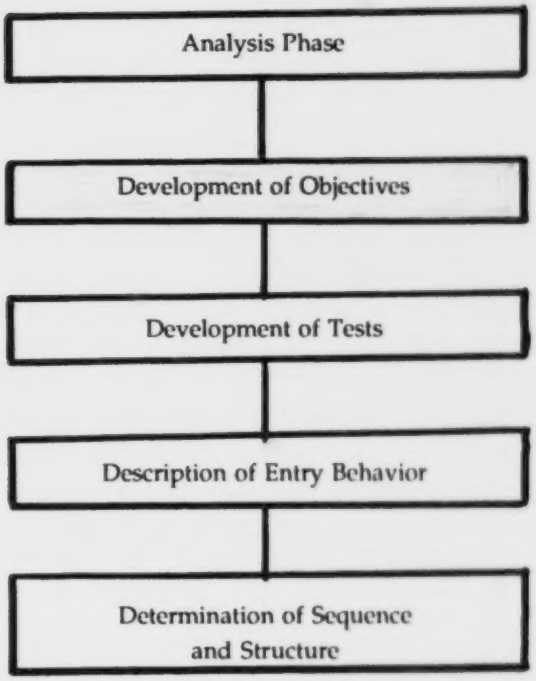
Selection of a method should be guided by the ability of that method to meet the following needs (in addition to the principles of media selection common to all courses):

- Wherever possible, the method should be able to be used in a stand–alone format, without the need for input from other students or the instructor.
  - Offline and online written materials, CAIs, storyboards, workbooks and notetaking guides, audio– and video–tapes, hands–on experiences, simulations and games, and television and radio broadcasts meet this need.

- The methods should provide diagnosis to the instructor and feedback to the student.
  - CAIs, online discussions, group exercises, and perhaps simulations and games (depending on their design) meet this need directly. All other methods require supplemental activities, such as quizzes, to provide for diagnosis and feedback.

- The method should accommodate the needs of students with respect to time demands, with minimal requirements that students be available to do certain activities at certain times.
  - Radio and television broadcasts are particularly insensitive to the need to be available at a given time, unless the student has the capability of recording the broadcast for future use.
  - Synchronous online activities should be restricted to those which can be designed so that students can schedule a mutually convenient time to participate.

B1. Development of Objectives



The purpose of this step is to verify and adjust existing objectives to be in agreement with the trained tasks.

Learning objectives for computer skills. In the SMART environment, the primary interest is in teaching the content of a particular course. However, by using SMART, additional requirements in the area of computer skills and knowledge are present. Hence, learning objectives (LOs) for computer skills must be added to the list of training LOs previously developed for the resident course.

In our discussion, we assume that SMART training will have been provided before students take their first technical lessons in SMART. However, review may be needed at the beginning of a phase or block of instruction. If a particular computer skill is used heavily in a block of instruction, Los directed at refresher exercises on that skill should be included. It may be possible to simply repeat the initial training. You should obtain the initial SMART computer training materials for use in your analysis of existing materials.

In particular, the initial training on applications software (i.e., spreadsheets, CAI packages, etc.) should be reviewed. If you are using applications software that was not introduced as part of the SMART computer training, you must provide LOs for training on this software.

Orientation LOs. One of the first objectives in a block of instruction should be to have the students "meet" each other online. To accomplish this, an orientation objective should be added to the list of resident LOs.

Remedial LOs. Due to differences in the entry behavior of the RC SMART student and the Active Duty resident student, remedial LOs may need to be developed. Keep this in mind as you perform the Design Phase step which deals with the description of entry behavior.

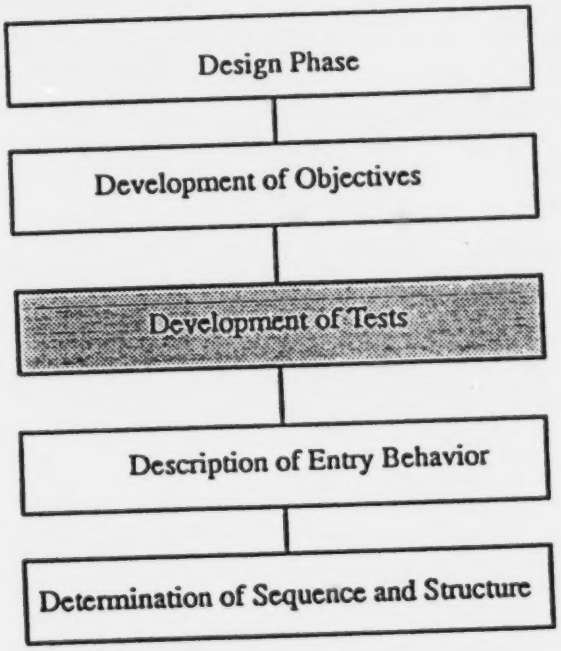
In particular, it may be the case that the resident program assumes that students have had prior course work that RC soldiers either have not had or have had in an abridged format designed specifically for the RC. In such situations, it will be necessary to incorporate LOs for this prerequisite material into the listing of LOs for the SMART course.

Deletion of LOs for activities that will not be trained. If the course managers

make the decision not to train certain activities (i.e., tasks trained in resident programs that would not usually be taught to RC soldiers via RF Schools, such as presentations by allied military personnel), their associated LOs must be deleted.

At the end of this step, you should have a complete list of all LOs to be trained, similar to the sample analysis and listing shown in the Special Topic on LOs.

B2. Development of Tests



The purpose of this step is to ensure that the tests given during the course match the learning objectives and that they are appropriate for administration in the SMART environment.

Use of frequent quizzes or other feedback mechanisms. Since SMART lacks the types of feedback regarding student understanding present in the resident classroom (i.e., nodding heads, puzzled looks), it is necessary to check understanding frequently (i.e., at each logical unit of instruction). Quizzes or other feedback mechanisms such as scored CAIs can be used for this purpose. In addition, the administration of frequent feedback measures provides a mechanism by which the instructor can determine if students have completed and understood the learning activities.

Mechanisms which provide immediate feedback are preferred to those in which feedback is delayed. An example of immediate feedback would be to use a computer–scored multiple choice quiz rather than an instructor–scored short answer quiz. Students become frustrated when feedback is delayed. Further, the literature has shown that prompt feedback increases both throughput and speed of completion.

Use of "chunked" rather than comprehensive exams. Since a block of instruction presented via SMART will be of much longer duration than the same block presented in resident school, performance exams issued for a grade should be presented in chunks rather than as a comprehensive exam at the end of the block.

If the exam to be given in SMART is the same comprehensive exam given in resident school, you should divide the exam into sections which correspond to the topics being taught and design the course such that these exam sections are administered throughout the course. This ensures that it is the degree of original learning, rather than long term retention, that is measured.

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SPECIAL TOPIC ON LOS: Identification of LOs

Part 1: Complete listing of objectives used at the resident school

— Given a classroom lecture, the students will be able to state the fundamental principles used in planning and conducting Rear Operations in accordance with FM 90–14 (Rear Operations LO).

— Demonstrate a working knowledge of planning and execution of Area Damage Control (ADC) operations, given a classroom, lecture, and listed references to the following standards: (a) understand the concept of ADC and how it supports the overall conduct of rear operations; (b) understand the responsibilities, planning considerations, and execution measures integral to ADC; and (c) understand engineer roles in ADC (Area Damage Control LO).

— The student will become familiar with Airfield Damage Repair (ADR) techniques, current Army and Air Force responsibility, and future developments in ADR. Given a classroom environment, the student will apply proper repair techniques and will know the quantity of effort for the ADR mission (Airfield Damage Repair LO).

— In a classroom environment, familiarize the student with a Military Pipeline System to include components and responsible agencies, and basic design procedures. The student will understand the fundamentals of a Military Pipeline System, and be able to design a T/O pipeline system (Pipeline LO).

— Given a classroom setting, the student will become familiar with doctrine and tactics of the Australian Army (Allied Presentation LO).

— Acting as an assistant battalion S–3, given the specifications of the paving project and ST 5–330–8, the student will be able to design a hot mix plant to include determination of the aggregate blend and the Optimum Asphalt Content (OAC); will be familiar with the hot mix asphalt plant and paving operations; and will be able to determine the Bill of Materials (BOM) for an asphalt paving project, to include both surface treatments and hot mix paving. The student's aggregate blend must be within the design limits, the student's OAC must be within .1% of the actual OAC, and the student's BOM must contain sufficient quantities of all required materials, in accordance with TM–337 (Asphalt Production LO).

Part 2: Addition of LOs

A: Computer LOs

— Students have had prior training on SMART, so no LOs are needed for the SMART system.

SPECIAL TOPIC ON LOS: Identification of LOs (continued)

— Analysis of setting options showed that use of a spreadsheet would be beneficial in accomplishing the asphalt production LO; students were not previously trained on spreadsheets, so add the following LO: Given the TWIN spreadsheet package and tutorial, students will be able to create and perform manipulations on a computerized spreadsheet, in accordance with the TWIN User's Manual.

B: Orientation LOs

— Students have not previously "met" on the SMART system, so add the following orientation LO: Given the appropriate hardware and software, students will enter a short biography into a group discussion item, in accordance with the SMART User's Manual.

C: Remedial LOs

— All students are Engineering Officers who have attended the prerequisite Engineer Officer Basic Course, so no remedial LOs are needed.

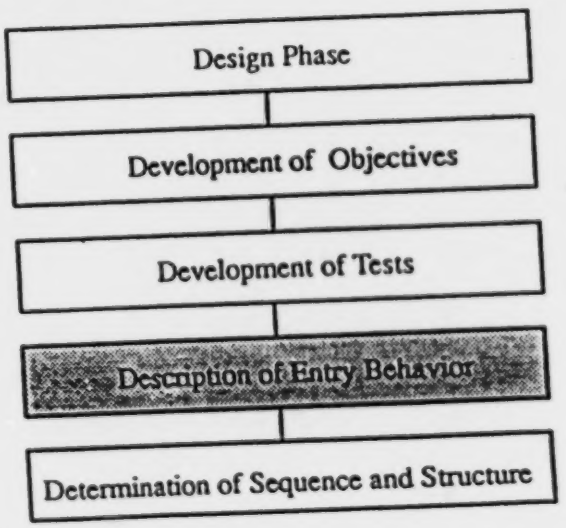
Part 3: Deletion of LOs

— All resident school LOs will also be taught in SMART, so no LOs will be deleted.

Testing of all LOs. Even though proficiency on SMART skills will probably not be part of a student's course grade, the LOs associated with SMART skills should be tested to ensure that the student demonstrates at least the minimum proficiency needed to participate in the course. Such a test should be given at the end of any computer training and before the skills are needed in the completion of other course requirements. Our observation has been that students without good computer skills can succeed in SMART courses, but the instructor and support personnel have an added burden since they must guide students through both computer and technical training.

Remedial LOs must also be tested to ensure that students are ready to receive the primary instruction.

B3. Description of Entry Behavior



The purpose of this step is to prepare a description of the target audience as contrasted to the original audience for which the course

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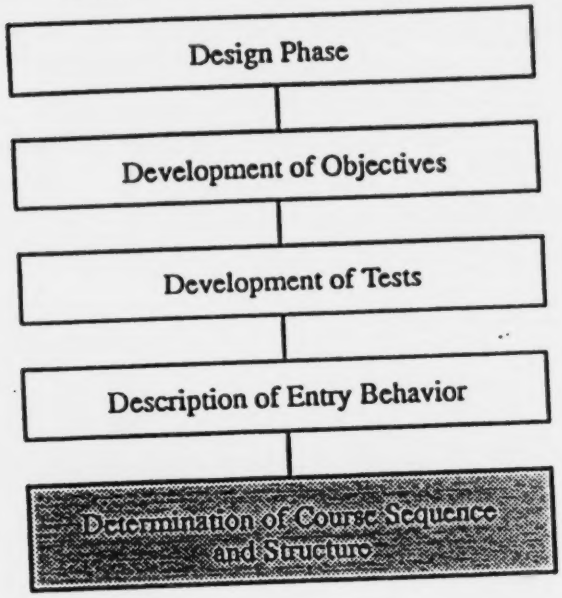
materials were intended. This exercise will also be helpful in the assessment of the need for additional LOs.

In considering the entry behavior of students for SMART courses, it is of primary importance to recognize that the course is being designed for adult learners (see the Instructor Guide for a discussion on the characteristics of adult learners), who are only part–time students, and who are studying at a distance over an extended period of time. This is the perspective from which all design and development must occur. The instructional program cannot be successful unless it meets the needs of the students for whom it is designed. As we discuss course development, characteristics of the SMART student which impact development will be highlighted.

Several likely differences between the entry characteristics of resident and SMART students come immediately to mind:

- One implication of having students work remotely in their homes is that they probably do not already know one another nor do they have the opportunity to meet one another face–to–face to form a sense of class unity. Hence, orientation activities must be planned for them to meet one another online.
- Prior training of RC students may not have included prerequisites, or may have included inferior prerequisites, for resident students. Remedial LOs must be designed to overcome such deficits.
- It is unlikely that students will be experts with respect to the use, assembly, or troubleshooting of computers. Deficits in these areas must be overcome by the addition of LOs dealing with computer skills, either in an initial training session which the student takes prior to beginning the first phase of SMART or at the beginning of a block of instruction. Course implementers must also consider how assembly, troubleshooting, and maintenance of computers will be handled.
- Other attitudinal, educational, and motivational differences may also be present. As a result, an addition of remedial LOs may be helpful. Future developers should consider the addition of such LOs.

B4. Determination of Course Sequence and Structure



The purpose of this step is to arrange the learning objectives in the most effective sequence for presentation in SMART.

The goal is to optimize throughput by capitalizing on pacing characteristics and inherent qualities of motivation that may be achieved through course sequence and structure.

The Special Topic on Sequencing of LOs illustrates the points made below. More detail on scheduling can be found in the In–Depth Look at Pacing.

Computer skills. If LOs dealing with computer skills have been added to the curriculum, the training associated with those LOs must be given before the content matter is addressed. Failure to train in requisite computer skills before starting on the technical content will only result in frustration and may lead to drop–outs. Further, lack of computer skills on the part of some students will slow the course for all.

Again, if you added LOs for computer training, plan to conduct that training *first*.

Whenever possible, allow for incremental skill building with respect to computer proficiency as content–related LOs are introduced. For example, rather than beginning the course with a content topic which the analysis of setting options has revealed to be heavily dependent on group activities, begin with one that emphasizes individual activities, since they do not require as much computer proficiency as group activities.

Orientation activities. Begin each new block of instruction with an "ice–breaker" or a "getting to know each other" experience based on the orientation LOs. This helps to lessen student anxiety about dealing with the impersonal aspect of a computer and may even serve to rekindle old acquaintances. Further, such exercises allow students to gain practice with group discussions on the computer in a situation which is far less threatening than a more typical group exercise which leads to a grade.

Synchronous activities, although more difficult than asynchronous or individual activities in terms of the computer skills required, seem to speed the development of rapport

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among the students. Thus, early synchronous work should be encouraged.

Remedial activities. If remedial LOs were added previously, activities must be designed for those LOs. Further, remedial LOs should immediately precede the content activities for which they are prerequisites.

Content activities. Several principles are involved in the sequencing and structuring of content activities:

- Begin the content lessons with an easy topic.

This allows students to continue to build confidence on the computer, and with one another, without the pressure of a difficult academic load.

- Begin the content lessons with an interesting activity.

This "grabs" attention and enhances motivation. The student comment below illustrates the potential benefits of this tactic.

- Alternate easy and hard content lessons.

This allows a window for "catching up" if a student has fallen behind and reduces burnout, thus, enhancing throughput.

> "What a disappointment! I just finished topic 0 [computer training] and I'm all fired up to go on to topic 1. I go into the first lesson hoping to really blitz through and make up some lost ground. And what do I find? The first activity tells me to read several chapters of a FM. Boooorinnnng! I know that presentation of the entire course by means of computer training is impractical, but from a psychological standpoint, don't you think the start–up is key in getting people excited?"

Determining a course schedule. The schedule for a particular block of instruction must be determined on at least two levels — the schedule in which the entire block must be accomplished and the scheduling of each individual activity. At this point, the individual learning activities have not yet been fully specified. (This takes place in the Development Phase.) Hence, scheduling of particular learning activities takes place later, when the instructional management plan is specified. Here, we are concerned with developing an overall course schedule based on our list of LOs.

The pace at which a block of instruction is conducted is a function of not only the time to complete the instructional activities but also of the administrative time associated with accessing and organizing computer–delivered materials.

We recommend a schedule which requires soldiers to work at a rate of eight hours per week (see Recommendations for

Implementation for further discussion of this issue). However, this eight hours must be divided into both instructional and administrative activities. Hence, only four to six hours per week will be available for instructional activities.

In scheduling a block of instruction, then, assume that the students will complete a maximum of six hours of instructional activities per week. Thus, for example, a block of instruction that takes two weeks (80 hours) in resident school must be scheduled to take nearly 14 weeks in SMART.

To determine an expected course schedule, you must begin with the number of hours of training in resident school; adjust that number to reflect the addition of LOs for computer skills, remediation, and orientation; delete any LOs judged non–critical for RC training; and finally, calculate how long the course will take given a six hour work week.

More detail can be added by specifying the duration of each topic (set of related LOs) using this same process.

Deadlines must also be added to the schedule. Experience has shown that deadlines are an absolute necessity. Figure 8 shows how well students kept up with an expected schedule of completed activities based on an eight hour per week time commitment given a no–deadline (for topics 1 through 5) versus a deadline (for topics 6 through 10) condition. Obviously, in spite of a preference on the part of adult learners for self–pacing, self–pacing does not provide the motivation necessary to keep moving through the course. Once deadlines were imposed, students moved through the course at or near the expected schedule.

Section C, Recommendations for Implementation, provides a further discussion of how deadlines should be set and enforced.

While the importance of deadlines cannot be overstated, it is also necessary to be aware of the need to build flexibility into the schedule. Remember that the students are part–time soldiers who will have events occurring in their personal lives that will impact their ability to meet the schedule. Thus, proper sequencing of LOs, which allows for "breathing space" by placing an easier topic after a more difficult subject, will aid in meeting student needs.

Further, inserting "slack" time in the schedule will enhance flexibility. For example, you may plan your deadlines such that every new topic begins on the same day of the week (i.e., Monday), regardless of the length of the previous topic. Thus, a student who could have completed a topic on Thursday, based on the total of the time estimates for the individual activities, would have a three day "grace period."

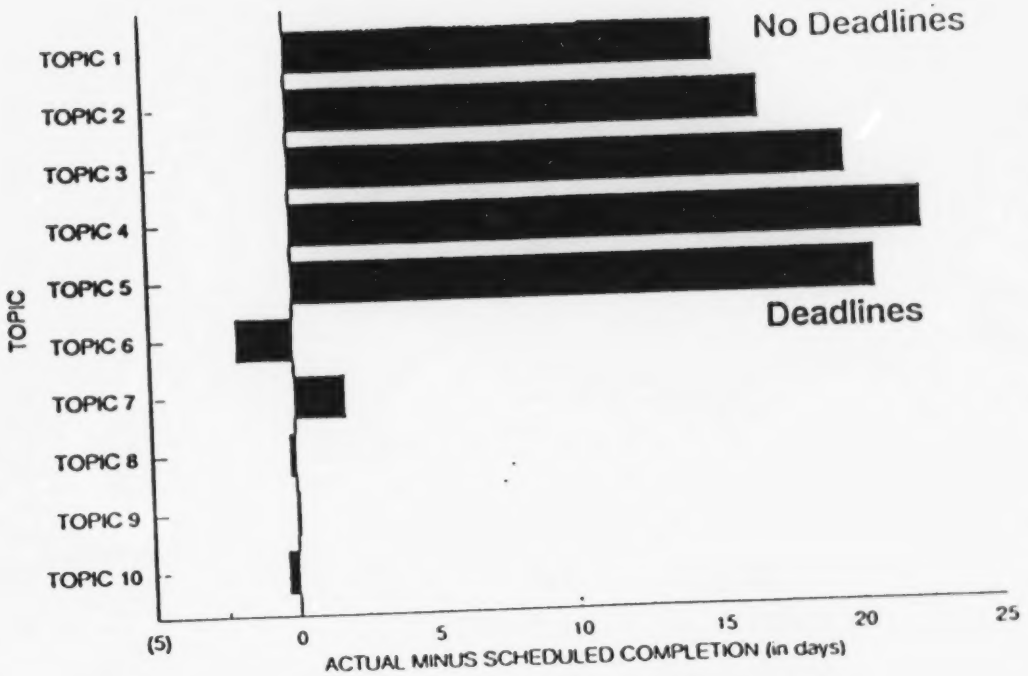


Figure 8. Differences between actual and expected completion times for no–deadline versus deadline conditions.

The Special Topic on Scheduling builds on the Special Topic on Sequencing and gives an example of the development of a course schedule, specifying topic schedules and deadlines.

It is likely that you will be working in an environment in which you have been told that a course must be designed so that it can be completed in a certain time period. Careful specification of individual learning activities in the Development Phase may assist you in adhering to such schedule constraints.

SPECIAL TOPIC ON LOS: Sequencing of LOs

Principle 1: Put computer LOs first

Principle 2: Put orientation LOs before content LOs

Principle 3: Put remedial LOs earlier in the sequence than the primary lesson
— In this case, there are no remedial LOs

Principle 4: Start with an easy LO
— Since the Rear Operations and Area Damage Control LOs are the most doctrinal and least mathematical of the LOs, they are probably among the easiest; Pipelines and Asphalt Production, being more quantitative, are more difficult—students at resident school had a great deal of difficulty with Pipelines; Airfield Damage Repair is of intermediate difficulty; the Allied Presentation is totally non–technical, thus quite easy

Principle 5: Alternate easy and difficult LOs

Principle 6: Keep interdependent LOs together
— The Area Damage Control LO builds on the points made in the Rear Operations LO, hence, these LOs should not be separated

Suggested LO Listing Based on Application of the Principles:

— Spreadsheet LO

— Orientation LO

— Rear Operations LO

— Area Damage Repair LO

— Pipelines LO

— Allied Presentation LO

— Asphalt Production LO

Note: Other permutations of this list, which satisfy the principles, are possible. The above is meant only as an example.

SPECIAL TOPIC ON SCHEDULING: Determining a Course Schedule from LOs

Part 1: How much time is devoted to content LOs at resident school?

— Rear Operations LO: 1 hour
— Area Damage Control LO: 1.5 hours
— Airfield Damage Repair LO: 2 hours
— Pipelines LO: 5.5 hours
— Allied Presentation LO: 1 hour
— Asphalt Production LO: 3 hours

Note: The above figures reflect classroom hours plus time estimates provided by the school for study or homework, if any.

Part 2: How much additional time must be scheduled for computer, orientation, and remedial LOs?

— Computer LOs: 1 hour
— Remedial LOs: None

Part 3: How much time is needed in SMART to accomplish the same LOs?

a. Total hours required to accomplish resident LOs: 14.5 hours

b. Total hours to accomplish all LOs: 16.5 hours

c. Total hours students are expected to work on content materials per week: 6 hours

d. Number of weeks needed to complete in SMART (b/c): 3 weeks

e. Expected weekly administration time to access SMART: 2 hours

f. Total administration time (d x e): 6 hours

g. Additional weeks needed to accommodate administration time (f/c): 1 week

h. Total weeks for course (d + g): 4 weeks

Part 4: Scheduling individual LOs within the total time frame

a. Number of days needed for each LO (hours for LO/6 hours per week x 7 days per week):
— Computer LO: (1 hour/6 hours per week x 7 days per week): 2 days
— Orientation LO: 2 days

SPECIAL TOPIC ON SCHEDULING: Determining a Course Schedule from LOs (continued)

— Rear Operations LO: 2 days
— Area Damage Control LO: 2 days
— Airfield Damage Repair LO: 3 days
— Pipelines LO: 7 days
— Allied Presentation LO: 2 days
— Asphalt Production LO: 5 days

Note: All calculations are rounded up to the next whole day, because mid–day deadlines are impractical for the RC student.

b. Total days needed for all LOs: 25 days

c. Total days available: 30 days (assume that you must conduct the course within a one month time period)

d. Slack time (c – b): 5 days

Part 5: Determination of schedule

Principle 1: Insert deadlines at reasonable intervals (usually after each topic or about once a week)

Principle 2: Insert slack time throughout schedule, as possible

Suggested schedule for above LOs:

Day 1: Begin Computer LO
Day 3: Begin Orientation LO
Day 5: Deadline for Computer and Orientation LOs (1st slack day)
Day 6: Begin Rear Operations LO
Day 8: Begin Area Damage Control LO
Day 10: Deadline for Rear Operations and Area Damage Control LOs (2nd slack day)
Day 11: Begin Airfield Damage Repair LO
Day 14: Deadline for Airfield Damage Repair LO (3rd slack day)
Day 15: Begin Pipelines LO
Day 22: Deadline for Pipelines LO (4th slack day)
Day 23: Begin Allied Presentation LO
Day 24: Deadline for Allied Presentation LO
Day 25: Begin Asphalt Production LO
Day 30: Deadline for Asphalt Production LO (5th slack day)

AN IN-DEPTH LOOK AT: Pacing

As an instructional designer or course implementer, it is important to remember that the students taking your course will have numerous and often inflexible time constraints. While the average distance student balances coursework with a full-time job and family commitments, an RC student experiences all these PLUS a part-time job in the Army. Since dropout rates in most distance education courses run between 50-80%, it is important to note that soldiers will be challenged to complete even the best designed course.

However, there are steps you can take to help pace students through the course at an efficient and yet reasonable rate:

Recognize that despite your best intentions and most educated guesses, you will probably UNDERESTIMATE the time it will take students to complete a given block of material. Research has shown that most course designers do underestimate completion time.

To reduce this possibility, during course validation, have several people assume the role of student and work through all sections.

CAUTION: Even with these estimates in hand, remember the context in which students will be working!

Administrative time must be calculated, because uploading, downloading, and printing all take time. As a course designer, it is natural for your to consider only the actual time to complete certain materials. However, from the student's perspective, <u>every</u> activity associated with the course is time on task.

It is reasonable to expect students to spend 8 hours a week on the course, and NO MORE! The research suggests that distance students spend from 10-15 hours a week on the course, but most educators suggest that 10 hours is a more realistic estimate. (HOWEVER, it is important to note that these studies focused on students who only had a full-time job and not on students who have 1-1/2 jobs, like RC soldiers.)

CAUTION: The eight hour ceiling includes administrative time, so actual time spent on course materials is less.

A ceiling of eight hours per week of course work will impact the duration of the course. Forcing students to work more might encourage faster completion, but would surely increase dropout rates, possibly to unacceptable levels.

Try to organize course materials to help students streamline their procedures and make the most efficient use of their time.

Pacing (continued)

For example, have several possible exercises that students can do once they're logged on to the computer, to reduce unnecessary logons.

Pacing is a critically important issue at all stages of the course, because the course is not over until the last student completes the last assignment. However, research has shown that the most critical period in terms of dropout is the first third of the course. After that point, most students will probably feel sufficient investment that they will try to finish.

Be aware of the dropout problems particular to the first part of the course. Note that many people who fail to complete a course are those who fail to even start it. Many people do not even submit the first assignment. Research has shown that submission of even the first assignment should help predict completion rates.

To encourage completion of assignments:

- Make the first assignment short and easy. Some of your students may be intimidated by the computer, and others may lack confidence because they have not taken a course for some time. The real purpose of the first assignment can be primarily motivational in nature.

- Because communication via the computer is so integral to the course, you might consider writing the first assignment to include some simple computer exercises, like uploading and downloading files, sending a mail message, and so on.

- In general, try to design your assignments in half hour to one hour chunks. Although longer assignments may sometimes be necessary, short assignments have several advantages:

  — Even the busiest student can probably carve out 30 consecutive minutes.

  — Short assignments can help motivate students because they get a sense of completion and accomplishment.

- As you convert course materials for use in a SMART course, make sure that the new version is not actually longer than the original.

The Air Force, for example, has studied the kinds of changes which occur when correspondence materials are revised or updated. The research showed that the revised course materials had more volumes, longer sections within volumes, and the elimination of illustrations and charts to make way for more text (which takes longer to study).

Pacing (continued)

Inadvertently increasing the amount of required reading in your converted course could have a negative effect on both performance and throughput.

One of the real strengths of a distance course is that students have more flexibility in scheduling their study times than if they were taking a resident course. In addition, because of the nature of computer conferencing, the classroom is open 24 hours a day 7 days a week.

To capitalize on the strengths of ACC:

- Students should always have a variety of tasks to be completed, in order to facilitate steady progress through the course. Students can work on one assignment while awaiting feedback on another.

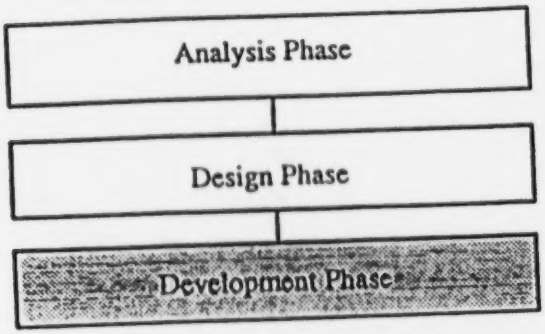
  CAUTION: Even if instructors log on frequently, there will still be unavoidable delays in providing students with feedback on their performance.

- Thus, it is important to have individual activities that students can complete while waiting on members of their group.

  CAUTION: Group projects can be invaluable learning experiences, but they require more time to complete online than in face–to–face situations. Further, some students work more slowly (or not at all), and can impede the progress of a group.

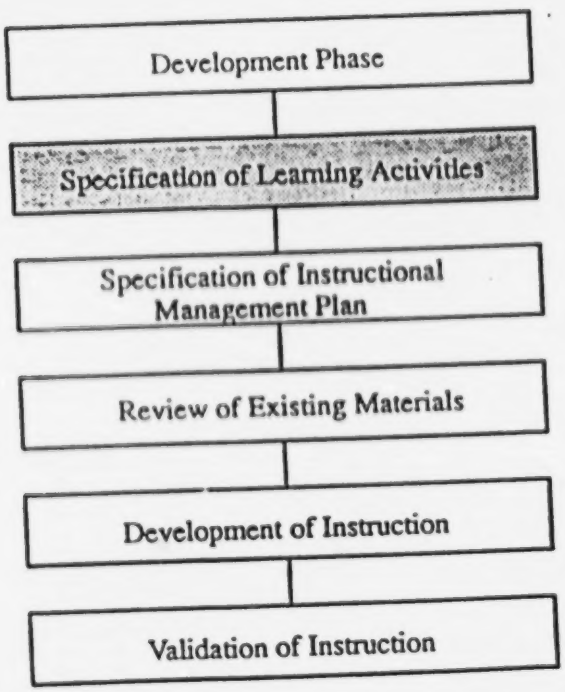
- So, be sensitive to the timing of group projects.

C. DEVELOPMENT PHASE



Like the design phase, all aspects of the development phase must receive special attention in SMART.

C1. Specification of Learning Activities



The purpose of this step is to outline the learning activities that will be used to achieve the LOs. At this point, the media or methods associated with each learning activity are decided upon.

The initial analysis of setting options will be used here. It should be noted that a complete list of the learning activities performed at the school was created in the initial analysis, along with an indication of whether the activity should be used as–is, converted for in–home use, or developed for out–of–home use. If activities are used as–is, the media and methods have already been specified. This may also be the case with materials which are recommended for out–of–home use.

Primarily, then, the focus of the step is on those activities which will be converted for in–home use, as well as on activities needed to accomplish additional computer, orientation, and remedial LOs.

The first step in specifying the learning activities is to decide on the number of learning activities that will be needed to fully address the LO. To do this, you must outline what each learning activity is expected to accomplish (what part of the LO it teaches).

Four guidelines are useful in the initial outlining of the learning activities:

- Each learning activity must contain a logical unit of the material specified in the LO.

Each learning activity should form a coherent whole so that students working over a

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period of days do not have to backtrack through previous activities to find the thread of the activity they are currently working on.

- LOs should be broken down into multiple learning activities, if possible.

If a learning objective encompasses several requirements, multiple learning activities to train those requirements should be defined. A larger number of shorter learning activities affords more flexibility to the student.

- Plan for a mandatory review session at the end of a topic.

Two factors make exam preparation necessary: a) long delays can occur from the time a student actually begins the learning activities for a topic and when the topic exam is actually administered; and, b) the potential lack of good study skills on the part of RC soldiers who may have been out of an academic environment for a long time is sometimes evident.

- Plan for contingency learning activities, if necessary.

It may be the case that the course managers have decided to have you develop contingency activities for some or all of the learning exercises. (See Recommendations for Implementation for a discussion of when planned contingency activities might be appropriate.)

Students are directed to access contingency activities when they have failed the primary instruction. The contingency activity presents the same content, usually in a different medium.

When you have completed this process, you will have a list of learning activities similar to that shown in the Special Topic on Specifying Learning Activities. Note that all LOs, including computer, orientation, and remedial LOs, must have specified learning activities. Further, activities to be used as–is and out–of–home activities would be included in the list, if applicable.

Once you know what each learning activity is to accomplish, you can begin to specify the methods and media for each activity.

The first decision to make is whether the activity will be an individual or a group activity. Guidelines for making this decision include:

- Emphasize individual activities.

Individual activities give students greater flexibility, since they do not have to wait for the input of others to complete the assignment.

- Use group activities as a pacing aid and make online communication essential to the function of the course.

Students develop a feeling of unity with their group members and will work hard to

catch up, if they are behind, so that they can contribute to the group exercise. Thus, interspersing some group activities among the individual activities may help them stay on schedule.

Group activities in which participation is optional (such as break room discussions) often become a side line to the course and are dropped if workload is high. Further, group activities reduce feelings of isolation. Finally, group activities may enhance experience sharing which can add a valuable dimension to the instruction.

Hence, do plan for mandatory group learning activities to enhance motivation.

The In–Depth Look at Group Interaction provides a great deal more information on the use of group activities.

Once an initial decision has been made regarding the method of instruction, media selection can take place. The following guidelines can be used in selecting media:

- Use variety in the media chosen.

There are as many opinions about the various media as there are students in a course—some like a particular medium, some don't. Nonetheless, the literature has shown that using a variety of media enhances the rate of course completion.

Since each student has access to a computer, you can exploit the full range of computerized media, including CAIs, storyboards, spreadsheets, online discussions, online reading assignments given by expert guest "lecturers," and analysis of online transcripts.

The In–Depth Look at Media Selection gives the strengths and weaknesses associated with some of the media available to you.

- Use media that maximize student control over acquisition.

One of the strengths of SMART is its flexibility—it allows students to choose when they work on the course. Thus, it may be counter–productive to use activities, such as radio or television broadcasts, that must be accessed at a set time if alternatives (i.e., audio– or video–tapes) are available.

One exception to this is that set–time activities may occasionally be used to aid pacing. Students may work hard in order to be caught up in time to get the most benefit from an occasional set–time activity.

- Design learning activities to maximize information processing.

Information processing can be increased by maximizing time on task and by providing guidance on how the learning activity should best be approached. The use of workbooks and notetaking guides which the students fill out in conjunction with other media helps to ensure that they process the information and

to call their attention to important points. Further, workbooks and notetaking guides provide hard–copy materials that can be used as references when they are away from the computer (i.e., in the field) or they are accessing another computerized lesson.

> CAUTION: Our experience showed that students *despise* being made to take notes from videotapes. Videos should be used only for activities where a general impression is to be conveyed and not where it is required that detailed technical information be retained. Notetaking guides should not be used with videos.

In specifying learning activities for staff group exercises, special care must be taken. Activities which are not explicitly reflected in the LOs may be required. To ensure that all the LOs needed have been targeted, it may be necessary to return to the Design Phase step that deals with the identification of learning objectives:

- Do students have the computer skills needed to conduct an online briefing, if one is required?

The online briefing is different from other synchronous meetings, especially with respect to the time pressure placed upon the students. Students should have practice with this experience prior to engaging in a graded briefing.

- Are students expected to perform activities in a staff group exercise that they have not performed during the course?

If it is likely that not all students have been taught material prerequisite for upcoming instruction, then prepare remedial material to have available for those that need catching up.

- Is an orientation to a staff group exercise required?

An orientation LO and an associated organizational activity may alleviate problems with procrastination at the start.

Even when all the LOs have been specified, there may be learning activities which are implied, rather than explicit. For example, the content–related LO is probably directed toward providing a written solution and/or an oral briefing to the staff group problem. In order to do this, the group must divide up the problem, work on individual solutions, and prepare a team report. The activities needed to complete the requirements should be explicitly defined.

The Special Topic on Learning Activities gives "how to" information about developing learning exercises.

SPECIAL TOPIC ON LEARNING ACTIVITIES: Specification of Learning Activities

For the purposes of illustration, we will use LO's for two topics: 1) a presentation by an Allied military official and 2) a class for military engineers on the production of asphalt. In specification of learning activities, you will perform these steps for all LOs.

Part 1: Outline of Learning Activities

Perhaps the best way of doing this step is to use a chart, like the one below, in which the resident school activities for each LO are listed along with the SMART implementations of those activities. Refer to the resident school activity descriptions and the ideas on SMART implementation that you developed in your analysis of setting options.

Resident School	SMART
Allied Presentation LO	
1) Lecture 2) Question and answer session These activities combined address all aspects of the LO.	1) Presentation of material covered in lecture 2) Presentation of information covered in representative question and answer sessions activity Since there is no exam, no review is needed.
Asphalt Production LO	
Four part lecture addresses all aspects of the LO: (a) ability to design a hot mix plant including aggregate blending and optimum asphalt content; (b) familiarity with hot mix plant and paving operations; and (c) ability to determine a bill of materials	This LO lends itself to being divided into multiple activities: 1) Overview of hot mix plant and paving operations—part b of LO 2) Aggregate blending and 3) Optimum asphalt content—part a of LO 4) Bill of materials—part c of LO 5) Pre-exam review

Assume that aggregate blending is a very difficult subject and a decision has been made to have a contingency activity for that material—two activities, one the primary required instruction and one remedial instruction, must be developed.

SPECIFICATION OF LEARNING ACTIVITIES (continued)

Part 2: Specification of Individual or Group Method

For each SMART activity listed in Part 1, you must designate whether an individual or group method should be used. Keep in mind that the emphasis should be on individual activities, but that group activities should be used to aid pacing and motivation.

Activity	Method
Allied Presentation LO	
1) Presentation of lecture content	Individual—material easily presented in self–contained form
2) Presentation of question and answer session	Group—good opportunity for group discussion (i.e., on differences between U.S. and allied Army)
Asphalt Production LO	
1) Overview of mix plant and paving operations	Individual—no need for group discussion on this material
2) Aggregate blending	Individual—group discussion not needed
3) Optimum asphalt content	Individual—again, probably no reason to have group work
4) Bill of Materials	Individual—group discussion not needed
5) Review	Group—students may derive some benefit from "hearing" what areas were problematic for others and may get answers to questions they would not have asked

Part 3: Media Selection

Media are selected in a manner similar to that used to decide on the methods to be used. Remember to introduce a variety of media, maximize student control over acquisition, and maximize information processing. As you perform this step, it will be helpful to jot short notes to justify your choices—you may decide to make some changes later. Again, use your analysis of setting options worksheet to jog your memory about viable media.

Note that information used in earlier parts of this process is repeated here. A single form for recording information for the entire process is given at the end of Section B.

SPECIFICATION OF LEARNING ACTIVITIES (continued)

Activity	Medium
Allied Presentation LO	
1) Presentation of lecture content	Videotape—the Allied official was very entertaining and a lot would be lost by putting this in any written form; visuals are needed
2) Presentation of question and answer session	Asynchronous discussion with Allied official—group activity with high inherent interest
Asphalt Production LO	
1) Overview of mix plant and paving operations	Paper reading assignment—need to show visuals, but originals are of poor quality, so not useful for storyboard; no need for feedback during presentation
2) Aggregate blending	Spreadsheet exercise—has many iterative calculations so use of spreadsheet will ease student burden; one drawback is the lack of feedback during the exercise Contingency activity—CAI that provides feedback on each step of the exercise
3) Optimum asphalt content	CAI with workbook—exercise would benefit from ability to provide feedback at each step due to quantitative nature; workbook provides hardcopy materials
4) Bill of Materials	Paper–based exercise—also calculational in nature; must design activity with internal checkpoints
5) Review	Synchronous group discussion—use a round–table where questions are directed at each student and their answers discussed so that all must prepare for the session

AN IN–DEPTH LOOK AT: Group Interaction

One of the particular strengths of classroom instruction frequently absent in distance education is communication among students. This absence is potentially troublesome for distance students who may experience serious isolation both from other students and from the institutions sponsoring the instruction. Communication between students is typically advantageous, particularly in the case of *distance* students. In fact, research has shown that communication with others can impact a wide range of outcomes, including throughput, performance, and satisfaction with the course.

Certain distance technologies, like audio conferencing, enable student–to–student interaction to a limited degree. However, asynchronous computer conferencing (ACC) is the only technology which facilitates so many forms of student communication. In fact, SMART can allow you to emulate many kinds of classroom interactions in a distance mode, thus preserving many valuable features of resident instruction. And, the diverse forms of interaction can not only reduce the isolation experienced by the traditional distance student, but can potentially strengthen a sense of affiliation with the Army as well as providing professional networking.

Types of Groups in ACC

Examples of group activities used in civilian CMC (computer–mediated communication) courses include: learning partnerships, tutorials, small working groups, seminars, and team debates. More information on group learning activities can be found in the Instructor Guide.

The following general guidelines should be taken only as suggestions for usage. No hard and fast rules exist.

- *Learning partnerships*, which typically consist of two students, are sometimes employed during the initial stages of a course to facilitate acquisition of computer skills. Motivation and mutual support can also be an important outcome. If your first assignment requires demonstration of computer skills, it can be written for individuals or learning partners.

Group Interaction (continued)

Learning partners may also be given other assignments, like the analysis of a text. After working together, they can upload the analysis for review by other class members.

- *Tutorials* typically consist of two students, one of whom assists the other in the acquisition of specific knowledge or skills. Assignments are made by an instructor based upon needs and proven competence of those involved.

- *Small working groups* can consist of anywhere from four to nine students, depending upon the goals and size of the project. These groups can give students experience coordinating efforts toward a common goal. At least two grading options exist: students can be graded upon their individual contributions to the group effort (as evidenced by the transcript) or as a group.

  Larger groups are not recommended as they will not only require substantial communications time, but will probably also involve substantial coordination problems which can frustrate the active participants.

- *Seminars*, like their face–to–face counterpart, can be a way of fostering a diversity of opinions on a specific topic. Discussion is based upon offline reading and analyses, as well as online contributions from other participants.

- In *debates*, students can be organized into teams which argue and defend an assigned position. Resource material for the debate can include required readings or even the transcript of previous discussions. Allow two weeks for a debate.

The Preeminence of Discussion

Whatever forms of group interactions you select, it is important to realize that group dialog is one of the strengths of *ACC*. If you select ACC as one of the media in your course, build in group activities. The expense and time intensity are probably not warranted unless interaction is one of your top priorities.

Group Interaction (continued)

In this respect, it is critical to note that use of ACC must be integral to the course and not simply a "frill" or "add–on." Both students and instructors have an ample workload without volunteering to engage in any activity which will not have a measurable impact on their performance or evaluation. Research has shown that neither tutors nor students use ACC if their work can be successfully completed without it.

- Consider requiring either a certain number of logons per week, a certain amount of online contributions, or both. (Requiring a certain amount from students per week may result in verbosity.)

  Data from some graduate courses suggests that 2–3 logons and 8–10 messages a week are not uncommon under certain circumstances. However, it is important to note that participation rates can be expected to vary as a function of subject material (controversial topics can be expected to elicit more comments) and student population. Little if any research has been conducted outside the Army on the use of ACC with students concurrently working a job and a half.

Characteristics of Group Discussion in ACC

Research in adult education shows that most adults prefer to learn from each other rather than an authority figure. (The resultant shift in the instructor's role is discussed at length in the Instructor Guide.) The students in the class will bring a wealth of practical experience that can be used to enrich your course material as well as to provide interesting contributions to discussion.

ACC can capitalize on adult's desire to learn from each other, because it can foster a many–to–many discussion in which students talk to each other as well as to the instructor. (A *one–to–many* discussion typically means that students direct all their comments to the instructor, who in turn, directs comments back to the class.)

Group Interaction (continued)

In this respect, research has shown that instructors in face–to–face courses may contribute 60–80% of the total comments in a session. In an ACC course, on the other hand, an instructor's contributions may drop to 10–15%. This apparent decline in instructor participation does not imply ineffectiveness. Instead, it can encourage students to discuss topics with each other. Thus, ACC can be a highly effective means to foster peer learning.

Synchronous vs. Asynchronous Interaction

ACC offers you the flexibility to design materials which can be used in either a synchronous or an asynchronous mode. There are advantages to each, so refer to the following list for an outline of some major considerations.

Synchronous

This form of communication is more expensive than asynchronous, since all participants are online at the same time. Thus, cost can be a liability, but there are cases where synchronous interaction is justified:

- It can be used to simulate a face–to–face exercise, like a briefing. Thus, it may be the only way to realistically simulate an important resident exercise.
- A synchronous meeting is perhaps the only means in a distance mode to simulate training situations where time pressure is an important consideration. For example, students can be allowed 2–3 hours of synchronous work time to complete an assignment.
- Synchronous meetings are often more efficient and reach closure faster than asynchronous interactions which can unfold over days or even weeks. Thus, it is sometimes useful for students to meet synchronously for an organizational meeting, prior to actually doing the work asynchronously.

Group Interaction (continued)

- Synchronous meetings may also be effective in the event of deadlines, because work can be expedited.
- Many educators suggest that a face–to–face meeting between all participants is helpful prior to the start of class. However, your students will probably not have this option, so an online synchronous meeting can help to introduce them to each other, the instructor, and the medium.
- A synchronous meeting can foster motivation, in part, because of the immediacy of contact (which also reduces a sense of isolation).

Asynchronous

Most of the interactions will be completed in this mode because of two factors: it maximizes flexibility for both instructor and students and it is more cost effective. Research has also shown that students not only learn in this medium, but enjoy doing so.

AN IN-DEPTH LOOK AT: Selection of Media

One of the most persistent findings in the distance edulation literature is that use of a variety of media facilitates both throughput and performance. Variety of media helps make a course more interesting as well as giving designers opportunities to match learning material with a specific technology. Researchers even recommend that similar material should be presented in a couple of different media, both to provide some necessary redundancy as well as to provide different ways of acquiring the information.

There are no hard and fast rules on what technologies to use for specific circumstances, because much will depend upon your exact subject matter, the student population, training circumstances, and so on. However, researchers have determined some of the strengths and weaknesses of different media with some suggestions regarding their most effective use.

Note: Some of the selection criteria for media in distance education may be the same as those impacting use in classroom settings. However, all of the following recommendations have been procured from the literature on distance education:

Asynchronous Computer Conferencing (ACC)—Strengths:

- Allows for either synchronous or asynchronous interaction
- Allows for flexibility in study times and for time to reflect and consult relevant resource material due to asynchronicity
- Is the only medium which allows students access to online databases (important for independent research)
- Allows for a wider range of group interactions than any other distance technology
- Facilitates brainstorming, networking, and tutorials

Selection of Media (continued)

- Guest speakers are possible via online communication
- Produces a transcript, a permanent written record of all communication. The transcript can be used for both instructional and assessment purposes
- Advantageous when development of writing ability is a priority
- Is highly interactive, which can help reduce the isolation of the distance learner
- Enhances motivation as many students are intrigued and excited by computers

ACC-Weaknesses:

- Communication and equipment/support costs
- Hardware/software problems (including both reliability and user friendliness)

Computer Assisted Instruction—Strengths:

- Is highly interactive, which can help reduce the isolation of the distance learner
- Provides immediate feedback on performance as well as diagnosis of students' weak areas
- Enhances motivation as many students are intrigued and excited by computers
- Can provide students opportunities to simulate a laboratory or field situation which might be difficult, dangerous, or expensive to actually perform

Computer–Assisted Instruction—Weaknesses:

- Cost of developing materials can be high
- Requires convenient access to a computer
- Students may neglect this resource unless it is integrated with the other course materials

Selection of Media (continued)

Television—Strengths:

- Good for presenting laboratory experiments, field trips, guest speakers
- Can facilitate attitude change and encourage students to empathize with other people
- Requires more sophisticated interpretive skills than other media, like cassettes, for example

THUS

- Make sure the relevance of the broadcast to basic course content is clear
- TV programs should contain a few simple aims rather than complex or many simple aims
- Supporting textual materials may have to be written to maximize the effectiveness of the broadcast

  For example, an evaluation of a telecourse indicated that students would have liked:

  (1) Pre–broadcast notes explaining objectives

  (2) Workbooks (including checklists) for use during broadcasts

  (3) Post–notes to help summarize and integrate main points; exercises to perform after the broadcast

- Students are often behind two or more weeks when they watch a broadcast

THUS

- Make each broadcast as self–contained as possible, and provide clear objectives at the start of each broadcast

Selection of Media (continued)

Television—Weaknesses:

- Pacing: students can't stop and restart broadcasts as needed (unless they own or have rented a VCR)
- It is difficult to watch the program and take notes at the same time
- Broadcasts are limited in number and inflexible in timing (can be compensated for with taping by a VCR)
- Can encourage passivity on the part of the students

Video Cassettes—Strengths:

A TV broadcast can either be recorded onto a cassette, or material can be especially designed for dissemination by video cassette. In this case, visual segments can be interspersed with pauses, during which students are expected to answer questions, take notes, or make comments. Compared to recorded broadcasts, material *designed* for cassettes tends to be more highly interactive and more highly integrated with other course materials.

- Have many of the same strengths as TV broadcasts. In fact, many distance teaching universities record their TV broadcasts onto cassettes
- In contrast to broadcasts, cassettes are under learner control. Research has shown that students appreciate both the control and the flexibility
- Unlike broadcasts, cassettes allow for individual differences in pacing. Students have the options of pausing frequently, fast forwarding, and so forth

Video Cassettes—Weaknesses:

- Some of the weaknesses of TV also apply to cassettes. In addition, students often focus on the factual content or story line instead of engaging in critical analysis. This problem is less acute with highly structured didactic materials like laboratory demonstrations, but can be significant in cases where material (like a documentary) is less structured and explicit

Selection of Media (continued)

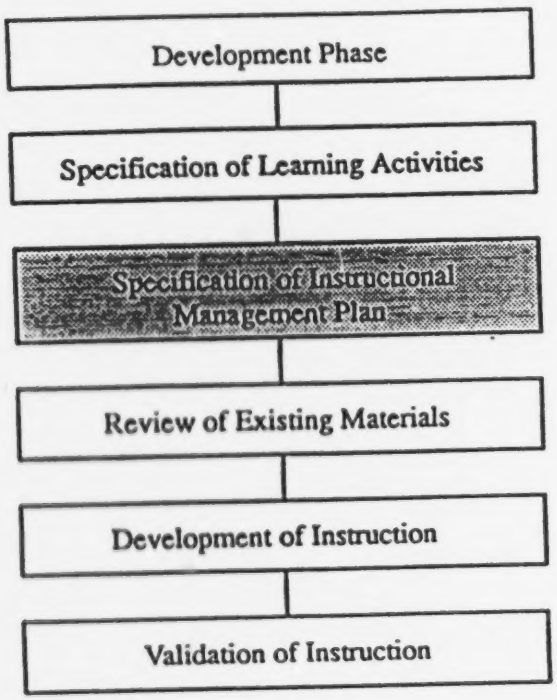
Audio Cassettes—Strengths:

- The sound of a human voice, particularly if it is the instructor's, can reduce isolation and help personalize the learning process for the distance student
- Through voice modulation, the instructor can not only convey enthusiasm (which can motivate students), but can also emphasize which points are most significant
- Pacing: students can listen to a cassette multiple times, and can start, stop, and rewind, as needed. As a result, the process is primarily under learner control
- An instructor can coach a student through the various steps of a process. A student listens to the tape and performs specified activities as directed
- Tapes can be coordinated with visual material like maps, reproductions of paintings or architecture, tables of statistics, etc. Thus, a combination of audio cassette and visual material can be effective for guiding students through complex diagrams, lengthy calculations, or action sequences
- Cassettes can be used to provide educational counseling, traditional lectures, additional reference material, or experience listening to a foreign language
- Instructors can record cassettes to provide remediation
- Most students already own a cassette player or have ready access to one

Audio Cassettes—Weaknesses:

- Most students are more experienced in learning from visual than auditory materials

C2. Specification of the Instructional Management Plan



The purpose of this step is to allocate time and resources for each activity. At the end of this step, you will have a syllabus suitable for use by the students.

Several principles should be followed in allocating time for individual lesson activities:

- Provide an accurate time estimate for each learning activity.

As has been previously stated, it is critical that the RC student be able to budget his or her time well. You will aid this process by providing them with reasonable expectations of how long a particular activity should take.

In determining time estimates, use the time allocations for the same activity in resident school as your initial guide. We have found that there is a "multiplier" for converting a lecture time to time needed for another individually–accessed medium. The estimate provided by the resident school, multiplied by the multiplier, will provide a good initial time estimate.

If a classroom activity takes one hour at resident school, it will take:

1.2 hours as a CAI

1.0 hours as a Storyboard

1.4 hours as a Paper Exercise

1.3 hours as a Paper Reading

Keep in mind, however, that this chart is intended mainly as an aid to estimation. Actual times will vary depending on the difficulty of the material and the types of activities being designed. For example, our experience has shown that, in general, readings from TMs and FMs take longer than readings from booklets designed for SMART (given the same expected completion time for both).

The best way to develop good time estimates is through thorough validation of the materials. As you perform validation at the end of the Development Phase, keep careful records of the time taken by the validators in

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completing activities. Adjust your time estimates accordingly, prior to course implementation.

Experience has shown that it is easier to provide accurate time estimates for certain types of individual activities than for others (i.e., there seems to be less individual variability in time requirements for some types of activities). Storyboards and videos, with their inherent pacing qualities, are more likely to be completed in the time estimated than are CAIs and reading assignments, in which different students may progress at various speeds through the same materials.

This is not to imply that storyboards and videos should be favored over other activities. Just be aware that there is a great deal of individual variability in the rate at which students will progress, even if they are committing the required eight hours per week. Again, alternating easy and difficult topics and building in "slack" time, where possible, will help to insure that all students can keep to the schedule.

Group activities take much longer in SMART than they do in the face–to–face classroom. Even though you may estimate that the student will spend a relatively small amount of actual time (maybe one to three hours) in asynchronous activities, this time will be spread over a relatively long period in terms of calendar time. Scheduling of group activities to accommodate their asynchronous nature is described below.

- Structure learning activities to be around one hour in duration. In no case should a single activity exceed three hours.

Since RC students typically work on the course in the evenings after fulfilling civilian job commitments, three hours is about the upper limit of the time you might expect them to spend on the course in one sitting. Shorter lessons allow more flexibility—a student with only a short amount of time available may choose to work on a short lesson, but would be unable to complete a longer lesson.

If possible, divide a long lesson into two or more shorter activities. This not only eases time constraints, but also gives the student a feeling of accomplishment as he or she completes each activity. If you must use a long lesson, be sure to warn the students of its duration. Note: You may wish to revisit the specification of learning activities at this point to see whether more and shorter activities should be added.

If possible, lessons should be designed such that students can exit the lesson partway through and return to where they left off. Students can become frustrated by having to begin a lesson again if they exited before finishing.

- Schedule group activities so they are parallel with individual activities.

Asynchronous group activities may take a week or more to unfold. Synchronous group activities require that all students agree on a time to meet to perform the exercise. In either case, if the group activity were to occur in series with other individual activities, students would have to wait until the group exercise was completed before moving on. This is very frustrating for those who wish to keep up momentum in the course.

- Allow time for completion of remedial activities.

If the analysis of entry behaviors has revealed a need for remedial training, time must be built into the schedule for those activities. Further, the course must be structured such that students cannot progress into the learning activities for which the remedial instruction is a prerequisite until competence on the remedial materials has been demonstrated. Hence, "gates" must be placed at the prerequisite such that SMART does not allow the student to begin subsequent activities until the gated activity has been completed.

- Gating may be used with the normal (i.e., non–remedial) instructional activities.

Gating is appropriate if the activities build on one another such that they should be accessed in a particular sequence.

Gating is also useful just prior to an exam to allow the instructor a chance to ensure that the student has completed the activities to be tested.

- Schedule time for planned contingency activities.

Contingency activities contain the same content as the initial learning activity. Hence, one would expect that a contingency activity would be completed in about the same time as the primary activity.

Since students are directed to access a contingency activity when they have failed on the primary instruction, it is not expected that all will access any given contingency activity. Nonetheless, some time must be left in the schedule to accommodate those who are directed to the contingencies.

Experience has shown that contingency activities were accessed in only about 11% of the opportunities to take them. This figure may be conservative, however, as students were under a great deal of time pressure and may not have had time to spend on non-required contingencies.

If an assessment can be made as to the extent to which the contingencies will be used (i.e., a good estimate might be that an "average" student will take 20% of the contingency lessons in a given topic), a proportional amount of time can be added to the time allocation for each topic (i.e., add 20% of the

total time estimated for contingencies in that topic).

- Schedule time for exams and set time limits for tests.

Time limits for each exam should be derived such that the time allowed for the exam is proportional to the percentage of points allocated to that section in the comprehensive test. For example, if students are given 60 minutes to take a 60 point test in resident school, sections should be given time allocations at a rate of one minute per point in the section.

As shown in the quote to the right, it may be the case that administration of exams by computer takes longer than pencil and paper administration, due to time spent in downloading questions, typing answers, and/or uploading responses. If this is the case, time limits for exams should be adjusted accordingly. Testing the exams during the validation step should aid in the specification of the time needed.

The In–Depth Look at Pacing found earlier in this section gives more information on time estimation.

In addition to providing time estimates for each activity, the instructional management plan should provide context for the activity. Since RC students usually distribute their study time, it may be difficult for them to keep track of where a particular activity fits in the larger context of the course. Instructions should be provided to orient them to each learning activity, and should include:

> "The exam was tough because the time is so short. The program needs to be set up so that we can solve the math part on the screen. By the time I solved the problem on paper and transferred the information to the screen I had used up about 23 minutes of the 30 allowed. I was afraid of double checking my work because I did not know if the clock would run out before I told the computer that I was complete... I type fast. The others, if they are not good typists, will have a hard time."

- A description of the activity, outlining what material is covered.
- A pointer to other related activities.
- A note that a group discussion may be occurring parallel to an activity or a topic.
- A listing of prerequisites (formal or suggested), if any.
- A list of the materials (i.e., TMs, readings, CAIs, etc.) needed to complete the activity and where they can be found.

Students in a SMART course are likely to be shipped an overwhelming amount of materials. Organizing the materials, then providing explicit pointers to them, will help free students from anxiety about how to deal with the materials themselves.

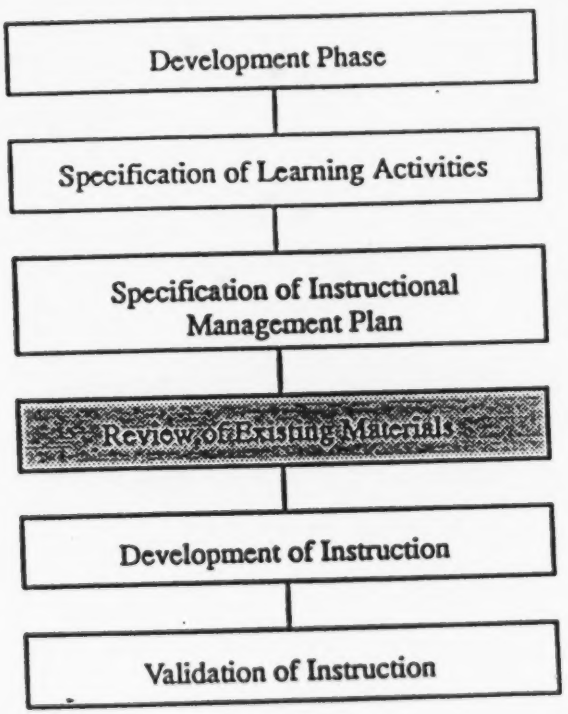
The instructional management plan serves as a syllabus or road map for the course, guiding the student through the learning

activities. The Special Topic on Instructional Management shows what the student syllabus should look like.

The instructional management plan is also a road map for the instructor, and should detail any special requirements or criteria for accomplishment of a particular activity.

Perhaps the best example of this is in the case of group discussions. Although it is not necessary to provide specific teaching techniques (see the Instructor Guide for a detailed discussion of teaching methods), you should provide an indication of the main points to be covered in the discussion to aid the instructor in facilitating the exercise.

C3. Review/Selection of Existing Materials



The purpose of this step is to review the existing instructional materials provided by the resident school to determine if they are suitable for use in SMART.

You will have obtained some indication of suitability in your analysis of setting options. The materials associated with those learning activities that you decided could be implemented in SMART "as–is," are more than likely suitable to be used in a stand–alone fashion.

Even resident school activities that need conversion to be used in SMART may have some usable materials. Two questions to be asked about all existing materials are:

- Can they be used as–is to satisfy requirements of the learning activities specified previously?

That is, will the existing materials provide all the instruction intended in the LO?

Or, if the materials do not provide complete instruction as they currently exist:

- Can they be supplemented (either with new materials or explanation by the instructor) to satisfy requirements of the learning activities?

In many cases, the resident school will have workbooks or notetaking guides that are used in conjunction with lectures. These same materials may be useful in SMART in conjunction with CAIs, storyboards, and the like.

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SPECIAL TOPIC ON INSTRUCTIONAL MANAGEMENT: Development of an Instructional Management Plan

Part 1: Time Estimates

As was mentioned previously, time estimates are based primarily on the time allocated for the comparable resident school activity. Some adjustments may be made, using the multipliers. This is left to your judgement—some activities will require more time than indicated by the multipliers, some less, depending on their complexity. It may be helpful to note how and why you adjusted the school estimates.

Using the Allied Presentation and Asphalt Production activities, for example, we would derive the following estimates:

Activity	Time at School	Time in SMART
Allied Presentation		
1) Video of lecture	45 min	45 min—Since notetaking is not required, students should simply watch the video
2) Question and answer session	15 min	30 min—Group activities take longer via computer than they do face–to–face
Asphalt Production		
1) Overview of hot mix plant and paving operations	50 min	60 min—Experience has shown that reading assignments take longer than classroom lectures (used a multiplier of 1.2 since material is not technically difficult)
2) Aggregate blending	60 min	60 min—Use of spreadsheet should ease computational burden imposed in the classroom setting (use same estimate for contingency)
3) Optimum asphalt content	40 min	45 min—CAIs take longer than classroom lecture (used 1.125 as a multiplier since material is not difficult)
4) Bill of materials	15 min	30 min—Paper exercises take longer than lecture; used 1.5 to get even time but 25 min would be adequate
5) Review	None	60 min—We suggest this as a minimum time for synchronous meetings

Development of an Instructional Management Plan (continued)

Part 1: Time Estimates (continued)

One note of caution: once you have estimated the time needed for each activity you must check back to the overall course schedule you developed in the Design Phase to ensure that the time estimated for all of the activities for a particular LO is not longer than the total time available for that LO. Be sure to add time for exams.

To do this, first compare the total activity hours for each LO to the hours allocated for that LO in the initial development of the course schedule:

- Allied Presentations: 1 hour estimated both for total activity hours and for LO
- Asphalt Presentation: 5 hours estimated for total activity hours (with a 20 minute exam and two 10–15 min quizzes): 3.5 hr for LO

It is not unusual for activity hours to exceed LO hours, since reviews, exams, and quizzes will have been added to the activity list. If this is the case, check to see that the activity hours can be accommodated in the number of *days* allocated to the LO:

- Asphalt Production: 5 hours of activities will take 4.28 days to complete; 5 days are allocated to the LO.

Note that there is also time in the schedule to do the aggregate blending contingency activity, if needed.

If there is not time in the course schedule for all activities to be performed as planned, either the schedule will need to be adjusted or the learning activities will need to be redesigned using media or methods that are less time consuming.

Development of an Instructional Management Plan (continued)

Part 2: Prepare Student Syllabus

Remember that the syllabus must include, for each activity:

- An activity description
- An indicator of how this activity fits with other activities
- A time estimate for the activity
- A list of prerequisite activities
- A list of related activities
- An indication of the materials to be used.

For the instructor, the syllabus must also include any special requirements.

A sample page of a course syllabus is shown below. The student version would not include the "Instructor Directions" part.

Sample Syllabus

4.1.1* Watch Video Tape

Short Description:	Watch the video–tape titled "Allied Presentation—Australia"
Estimated Time:	45 min
Instructions:	Watch the video–tape titled "Allied Presentation—Australia." This video–tape was made of a live lecture from the EOAC resident course. It is accompanied by an asynchronous group discussion with the instructor you will see on the film (see activity 4.1.2).
Materials:	Video–tape: Allied Presentation—Australia
Prerequisites:**	3.6.4 Passed
Instructor Directions:	Encourage students to move on to the synchronous discussion as soon as possible to stimulate conversation in that activity.

Development of an Instructional Management Plan (continued)

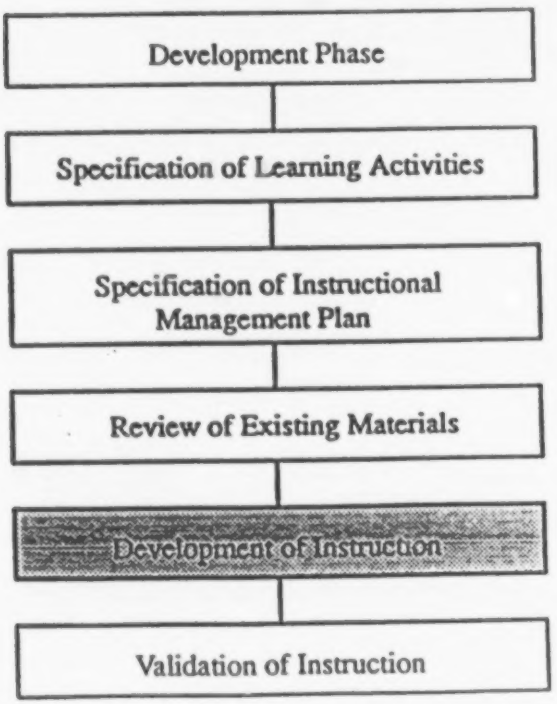
Notes: * Each activity could be assigned a number so that students could immediately see where they were in relation to other activities. Activity 4.1.1 means that the activity is part of the 4th topic, is in the 1st subtopic (group of related activities within a topic), and is the 1st activity of that subtopic.

**Activity 3.6.4 is the exam from the previous topic (Airfield Damage Repair). Soldiers could not move into a new topic until they had finished the previous one—they were "gated."

We also recommend that deadlines be included on the syllabus sheets, as appropriate. Obviously, not every activity will have a specific deadline.

If existing materials cannot be used as is, supplemental or entirely new instruction must be developed. That is the purpose of the next step in the Development Phase.

C4. Development of Instruction



Development will mainly consist of repackaging existing materials (particularly notes from live lectures). That is, the format will be changed without substantially altering the content, or existing materials will be supplemented. If you have added LOs, you may need to develop instruction entirely from scratch.

Obviously, in developing SMART instruction, you should adhere to the principles of good instructional design. A few of these principles are particularly important in the SMART environment:

- Use instruction that requires active participation as much as possible.

SMART students are already isolated from their classmates. Passive instruction could have the effect of making them feel even more removed from the learning experience; active instruction is more inherently motivating.

- Accompany "perishable" instruction with hard-copy supplements.

Students will not always have access to their computers. Hence, instruction stored solely on the computer becomes perishable, in the sense that it is not available for reference. Hard–copy notetaking guides or workbooks can be referred to at a future time.

- Make instructional materials as self–contained as is practical.

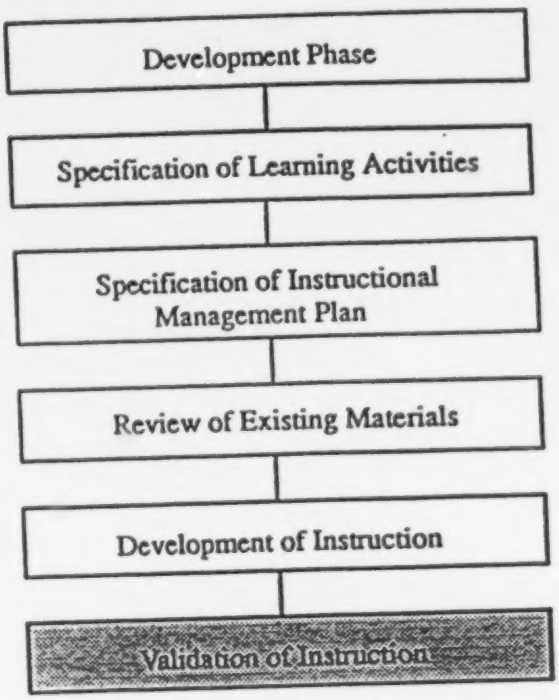
Students working in isolation may become confused if they need to use multiple materials to accomplish one task. For example, one working on a CAI with a workbook should not be told to consult a graph in a TM if that graph could be reproduced in the workbook or on the computer screen.

- Develop instructor materials.

The materials provided for the instructor should include solutions to exercises and homeworks, keys to exams and quizzes, and "scripts" for discussions.

"Scripts" are actually a set of guidelines for the points that the instructor is to evoke in the course of the discussion, rather than a set piece of text to be uploaded. The instructor will have been trained as to how to elicit responses.

C5. Validation of Instruction



Once instruction has been developed, you must verify the accuracy of *all* of the instructional materials and their associated time estimates.

Validation should occur in the context in which the materials will be used. That is, materials should be accessed through the SMART environment. Otherwise, it will be impossible to assess the administrative time load.

Validators should be as similar to the expected real students as possible, and should be cautioned to work through the materials as

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though they were taking the course for a grade.

Obviously, the results of the validation should be used to improve upon the materials and to adjust time estimates to be more realistic, if needed.

The next phase of the SAT process deals with the implementation of the course you have just developed. Implementation is addressed in the next section of this manual.

Although you will probably not be responsible for the actual implementation, it may still be instructive to read this section. It may give you a better appreciation of how your instruction will be used, and make you a better course designer!

BLANK WORKSHEETS

SETTING OPTIONS ANALYSIS WORKSHEET

Description of Learning Activity at Resident School:

Analysis of Setting Options:

_____ Materials suitable as–is
_____ Materials suitable for conversion
_____ Materials must be taught out of the home

Most Suitable Conversion Options (if applicable):

_____ Offline written material
_____ Online written material
_____ CAI
_____ Storyboard
_____ Workbook/notetaking guide
_____ Audiotape
_____ Spreadsheet exercise
_____ Videotape
_____ Online discussion
_____ Group exercise
_____ Hands–on experience
_____ Simulation or game
_____ TV or radio broadcast
_____ Paper–based exercise

Notes on Conversion Options:

Description of Out of Home Teaching Methods (if applicable):

COURSE SCHEDULING WORKSHEET

Part 1: How much time is devoted to content LOs at the resident school?

Part 2: How much additional time must be scheduled for computer, orientation, and remedial LOs?

Part 3: How much time is needed in SMART to accomplish the same LOs?

a. Total hours required to accomplish resident LOs:
b. Total hours to accomplish all LOs:
c. Total hours students are expected to work on content materials per week:
d. Number of weeks needed to complete in SMART (b/c):
e. Expected weekly administration time to access SMART:
f. Total administration time (d x e):
g. Additional weeks needed to accommodate administration time (f/c):
h. Total weeks for course (d + g):

Part 4: Scheduling individual LOs within the total time frame

a. Number of days needed for each LO (hours for LO/6 hours per week x 7 days per week):
b. Total days needed for all LOs:
c. Total days available:
d. Slack time (c – b):

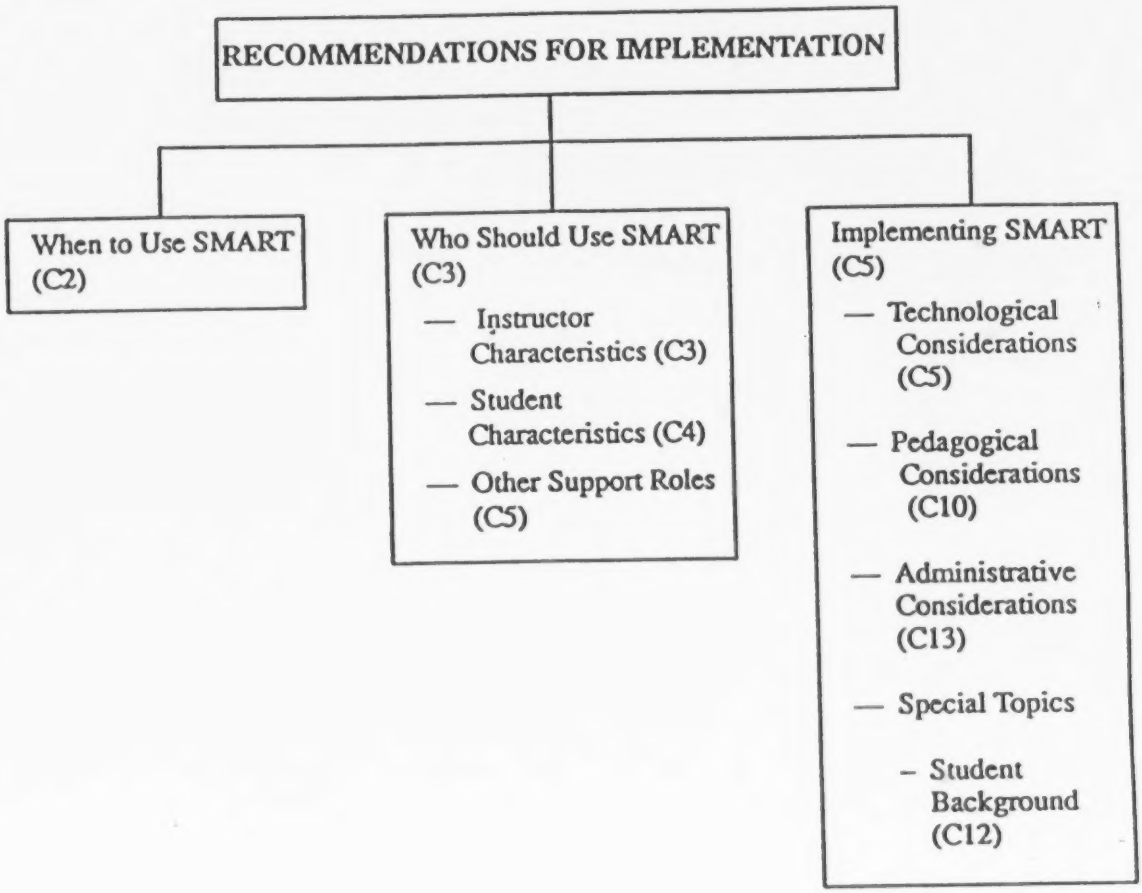
Part 5: Determination of schedule

Principle 1: Insert deadlines at reasonable intervals (usually after each topic or about once a week)
Principle 2: Insert slack time throughout schedule, as possible

LEARNING ACTIVITY

Resident School Activity	SMART Activity	SMART Method	SMART Medium	Time at School	Time in SMART

SECTION C


RECOMMENDATIONS FOR IMPLEMENTATION
When to Use SMART (C2)
Who Should Use SMART (C3)
— Instructor Characteristics (C3)
— Student Characteristics (C4)
— Other Support Roles (C5)
Implementing SMART (C5)
— Technological Considerations (C5)
— Pedagogical Considerations (C10)
— Administrative Considerations (C13)
— Special Topics
– Student Background (C12)

RECOMMENDATIONS FOR IMPLEMENTATION

The success of any training course is directly related to how well it transfers from the development stage to the execution stage. This transfer process is commonly termed implementation. Although implementation is a key factor in any course, it assumes additional importance in the SMART environment due to its remote and technologically–based nature.

The topics covered in this section on implementation include:

- When SMART should be used
- Who the users (both students and instructors) should be, and
- How courses should be implemented from a technological, pedagogical, and administrative point of view.

WHEN TO USE SMART

Like any type of training program, SMART has both its strengths and weaknesses. When selecting a training medium, it is always important to properly match a set of training needs and requirements to a specific training environment. SMART is especially attractive as a training medium when:

- There is a need for training to be delivered to the soldier's location.

If soldiers cannot attend a resident course, then SMART is an ideal way to bring similar training to them.

- There is a need to match the training schedule to the soldier's everyday work schedule.

The SMART environment is highly flexible and can be easily adapted to the irregular and demanding schedule of the part–time student.

- There is a need to maintain high quality training standards and incorporate the latest updates into the training material.

The SMART environment can match, and in some cases perhaps even surpass, the quality of resident training. It is also highly amenable to change, and can easily incorporate the latest updates in technology, doctrine, tactics, or strategy.

Courses that can be converted to the SMART environment include almost any course that is normally taught in a self–contained classroom. For courses that are not completely self–contained, the SMART environment may be used in conjunction with supplemental out–of–home activities. For example, a soldier may take part of a course through SMART, and the other portion at an armory or reserve center under the direction of the training officer.

Courses that involve extensive hands–on activities (such as large engine repair) may not be good candidates for the SMART learning environment. An exception to this generalization is if such manual activities can be simulated via a computer or interactive videodisc system. If such simulations can be enacted, then the SMART environment is an excellent delivery medium.

WHO SHOULD USE SMART

Due to the unique characteristics of the SMART environment, careful consideration should be given to the selection of both SMART instructors and students alike.

Instructor Characteristics

SMART Instructors must:

- Possess the necessary subject matter expertise.
- Receive media–specific training on the unique characteristics of the SMART environment.

This training should include instruction on online interactions and the specific use of other stand–alone software. Both the course developer and the instructor must understand that the SMART environment is unfamiliar and somewhat foreign to most of us. It is, therefore, especially important to receive training on the specific facets of the SMART system. The Instructor Guide gives valuable information on the training needed to be a SMART instructor.

- Understand and become oriented to the special environment of SMART regarding the pace of online instruction, and the need for assuming the role of a course facilitator.

In a normal classroom, instructional events, such as a classroom discussion, occur almost instantaneously. In the SMART environment, however, a similar discussion may unfold over a period of days.

Also, in the SMART environment, the instructor spends less time *providing* course content than the resident instructor and more time *guiding* and facilitating soldiers through the learning experience by directing their studies, answering questions, and providing performance feedback.

- Adapt their schedules to those of their students.

Students work on a 24 hour, seven day a week schedule (see Figure 9). Instructors must be able to be available to accommodate their needs.

As shown on Figure 9, most of the instructor's work is done during normal working hours. This is adaptive in ensuring 24 hour turnaround time in providing feedback and answering questions. At the same time, since students are working at other days and hours, especially in the evenings and on weekends, the instructor must be available for consultation during some of those times.

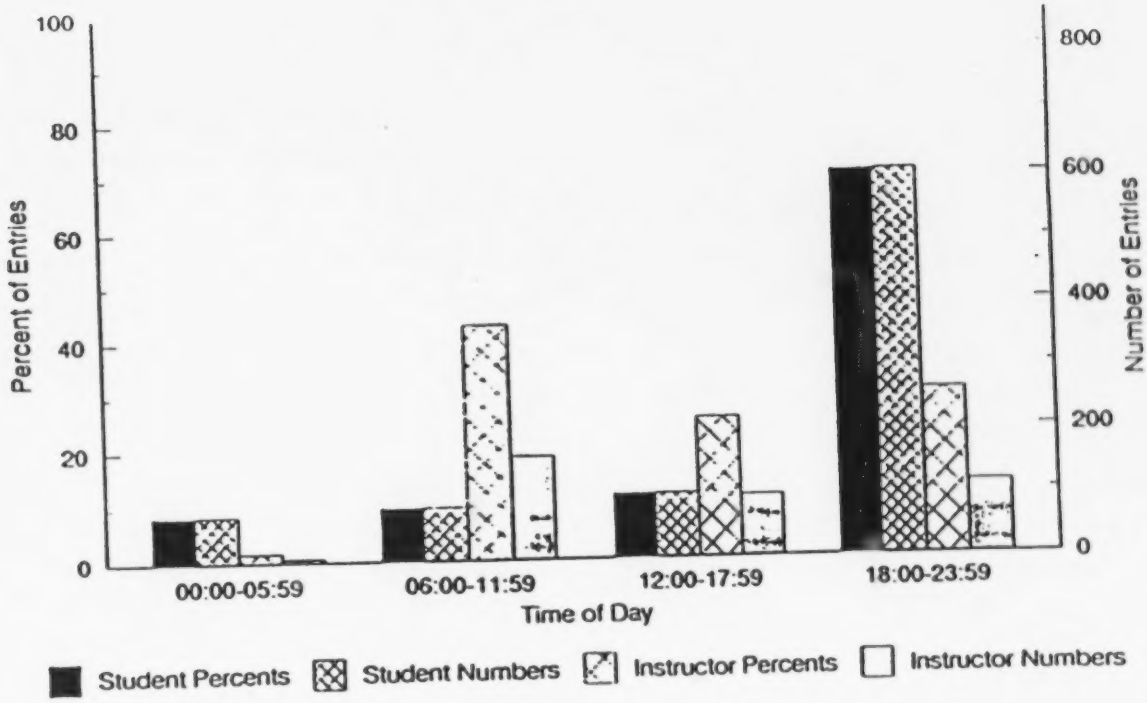


Figure 9. Student and instructor work schedules.

- Probably be full–time instructors.

It is unclear whether a part–time instructor would be able to function successfully in the SMART environment. This would most likely depend on the class size and the ratio of individual to group activities, since these factors greatly influence the time commitment needed on the part of the instructor.

Although part–time instructors who are fully responsible for course administration may not work in SMART, part–time teaching assistants could certainly be a valuable asset. Such assistants could provide a wide range of services, such as grading assignments or leading particular group activities, and would serve to ease the workload of the primary instructor.

Student Characteristics

Soldiers participating as *students* in the SMART environment must:

- Have their expectations properly set prior to beginning a SMART course.

This orientation should include an understanding of what SMART is, the time commitment necessary for successful completion of a SMART course, and expectations regarding participation, conduct, and grading. Remember, the more fully informed the student, the more likely the course and the soldier are to

succeed. On the following page is an example of a set of norms for the student to live by.

- Receive training on requisite computer skills *prior* to beginning a SMART course.

Such training serves two purposes. First, it facilitates the startup of any course, since the instructor and students alike are not spending their time figuring out how to use the computer system. Second, it alleviates considerable frustration for both and may help avoid early dropouts who are frustrated because they "...can't use the #!@*% computer."

Other Support Roles

There are two other types of individuals who may assume occasional, but important, roles during a SMART course. These are the team leader and the briefing officer.

The *team leader* is a staff member who troubleshoots personal problems for the students, facilitates team building, and serves in a nurturing role to the students. Team leaders can be instrumental in helping to achieve a positive learning experience. It is important that students have a sense of continuity with the team leader. Once a team leader is assigned to a group, he or she should stay with that group for the duration of the course.

If a briefing is to be conducted, a senior official is needed to receive the briefing. This lends an appropriate sense of realism to the experience. At a minimum, the official must have experience with briefings. If content experts are not available for support with respect to the framing of technical questions, then the official must be capable of serving as a subject matter expert. Although not imperative, it is never the less beneficial that the official also have some knowledge and expertise in online communication techniques.

IMPLEMENTING SMART

This section covers three important aspects of implementing a SMART course: technological, pedagogical, and administrative considerations.

Technological Considerations

Computer hardware and software, and the associated technologies necessary for using them, are of primary concern in SMART.

Hardware. The hardware used in SMART must support six functions:

— First, as a communications interface between the user and the main computer which hosts the conferencing system.

PCs used in SMART must have the ability to communicate with the central computer. Three hardware options are available to accomplish this:

(1) A 1200 baud modem—this is the slowest modem that should be used in a computer conferencing class. Slower modems would increase the administrative time requirements placed on students and staff beyond a reasonable limit because of the great volume of information to be transferred.

Some Norms to Live by (Provided by Instructor)

"When we enter a face–to–face class, we all know from years of experience what the instructors and students expect of us. Since computer conferencing is so new, the class norms are not so clear. I made a list of some things that I think make an ACC class run more smoothly. Print this list and tape them to the wall by your computer. If you can think of others, put them up as responses to this item. Here they are:

1. ALWAYS respond to messages or comments directed to you from others. I get extremely frustrated when someone does not answer my question.

2. Inform the class when you are going away for more than a few days.

3. Join the conversation. ACC instruction works only if everyone participates. This is especially important when you participate in a graded group project.

4. Keep your responses to the topic of discussion. If you have something to say that does not fit in one item, put it in a new item.

5. Responses do not have to have perfect spelling nor perfect grammar. Getting a response online is more important than anything. Just make sure that the response is understandable.

6. Compliment others whenever possible. In this medium, we do not see the non–verbal communications such as smiles or head nodding. Therefore, written compliments are the only way to tell people how you feel.

7. Learn to accept and understand the delays in communications. Because of the asynchronous nature of this medium, there are delays. There is no room for slacking off. You must KEEP UP and PLAN your time carefully. Others are depending on you!

8. Read each message and respond positively. The lack of non–verbal communications in ACC can cause a joke to seem rude. If you do not understand the meaning behind the words, ask.

9. Make responses short and to the point. (No more than 25 lines of text for responses and 50 lines for items.)

DO YOU AGREE WITH THESE NORMS? CAN YOU THINK OF OTHERS? LET ME KNOW AS A RESPONSE TO THIS ITEM."

(2) A 1200/2400 baud modem—the 2400 baud modem will be more expensive to buy than the 1200 baud, but the savings in communications costs will more than make up for the additional expense. However, many soldiers may still have to communicate with a 1200 baud modem because the communications networks in many areas cannot support 2400 baud communications.

(3) A fax card—a fax card is a device installed in the PC that allows the system to communicate just like a facsimile machine. This device can communicate at up to 9600 baud, depending on the quality of the telephone line. A fax card will not communicate between the PC and the host, but can be used to transfer assignments between the instructor and the student. This would be an excellent tool for the instructor to use to show students exactly where they made mistakes in an assignment, for sending briefing charts, and for sending graphics to help them understand a concept. The one drawback of this device is that an optical scanner would be needed to transmit hard copy (rather than computer files). The expense of buying scanners for each student would be prohibitive. However, it may be possible to provide scanners for instructors.

— Second, as a storage device.

The PC will have to store the communications software, word processing software, any computer aided instruction lessons or storyboards, and information downloaded from the host computer. The amount of storage needed could range from 10 to 40 MB, depending on the conferencing system used. Whatever the size, a hard disk is a necessity.

Instructors will usually need more disk space than students because of the administrative duties needed to track student progress.

Along with a hard drive, both students and instructors need one floppy drive for use as method to input new software to the hard disk.

— Third, as a visual output device.

Students need a monitor for the display of instructional materials. The type of monitor used will be determined by the material to be presented. A monochrome monitor is sufficient if only text is to be presented. For graphically oriented work, a color screen of high quality (EGA or VGA) would be preferred.

— Fourth, as a computational device.

The PC will be used to file downloaded information into the appropriate location and sort that information when the student wishes to retrieve it. The more computational work the PC must perform, the faster it must be. If the PC is to act only as a communication device on which the student interacts with the host computer, then it does not have to be very fast. A PC with no internal memory (a "dumb" terminal) could be used. This reduces the equipment costs, but greatly increases the communications costs, as all activities must be performed directly on the host computer.

If information is to be downloaded and stored, then a more advanced computer must be used. A computer with at least a 8 Mhz clock speed is recommended.

— Fifth, as a hard–copy output device.

Soldiers need the ability to print information for future reference at times when the computer may not be available to them. Thus, a printer is needed. Output quality needs only to be legible (like that from a dot matrix printer), as the printer is not intended for use for purposes other than students' personal use within the course.

— And sixth, as a link between the student and the electronic classroom.

In SMART, students need easy access to a computer. If unable to access the computer for even a few days, they may fall behind and not be able to recover. Hence, the portability of the computer should be considered.

A normal nonportable desktop computer is adequate if students are not expected to take vacations, be called away on business, or have extensive RC duties (like annual training) during the course. This, however, is unlikely—unplanned events always appear in students' lives. A portable computer could be taken on these unplanned absences.

Further, portable computers are more durable than desktop models. They have been designed to be moved and shipped. The number of maintenance calls will be reduced if participants are issued portable equipment.

Minimal Hardware Requirements
— 1200 baud modem
— 10 MB hard disk
— One floppy drive
— Monochrome monitor
— Internal memory
— 8 Mhz clock speed
— Dot matrix printer
— Durability

Maintenance and trouble–shooting are important considerations in determining the type of hardware to use. If the equipment is all the same, maintenance and problem solving efforts will be reduced because the same problems (and their once discovered solutions) will recur.

If the Army is to provide the computers, it is recommended that all participants receive the same equipment.

Student provided PCs will greatly reduce initial equipment investment by the Army, but will increase costs for troubleshooting.

Software. Software serves three functions in the SMART environment:

— First, it links the PC with the host computer.

The capabilities of communications software packages range from those that simply allow the user to connect to the host to those

that automatically download, sort, and store the communicated materials.

The first of these types requires learning all of the details of computer conferencing on the host and also increases communication costs because all of the work is done locally.

The second type is more difficult and costly to develop and requires a more sophisticated computer (i.e., higher clock speed, more storage space).

An intermediate point in the range of capabilities—software that does most of the downloading and uploading automatically but leaves some of the file management to the student—is probably most cost–effective.

— Second, it presents instructional materials, like CAIs and storyboards.

Software packages selected for the presentation of instructional materials must be of the proper "resolution" to meet the needs for which they are intended. For example, in selecting a CAI package for computational instruction, choose one that allows a wide range of answers to accommodate rounding errors and imprecision in some calculators.

Further, select packages that maximize student control over acquisition. Two examples: storyboards that allow user control of the rate of page turning, and CAIs and storyboards that allow you to exit in the middle of the lesson then return to the same place where you left off.

Finally, instructional packages must be compatible with the communications software.

— Provide special applications, such as word processing, spreadsheet, database, or graphics packages.

Students should be supported with software that helps minimize the number of activities that they must perform manually. Computer assistance may ease the time requirements and leave a greater proportion of time available to study lesson content.

Special consideration must be provided to training on the use of any software packages. (See Section B for a detailed discussion of the need for added learning objectives for computer skills.) Training materials, in addition to tutorials provided with any off–the shelf–software, will probably be required. And, documentation must be complete, detailed, and easily understood by non–programmers.

Finally, with most software packages, updates are easily accomplished. Careful configuration control is needed, however, to ensure that all participants are working from the same version of the software.

Other considerations. Two other technological issues must be addressed in any SMART implementation:

— Telephone lines.

Students link to host computers via telephone lines. This means that all must have a telephone!!

Further, the telephone lines should be of high quality, so line noises do not interfere with the signals being sent. Rural areas have the greatest problem with this.

Another problem arises with special telephone features, such as call waiting. Call waiting will cause the computer to disconnect if the feature is not disabled by using a special code.

Systems such as Merlin, which connect differently than the usual home telephone, may also cause problems.

— Power requirements.

All computers must be accompanied by surge protectors to shield them from voltage spikes. In areas where the power routinely falls below 120 volts, students will need voltage regulators or battery power supplies. If students have problems with files being destroyed, voltage regulators should be provided.

Pedagogical Considerations

There are a number of pedagogical considerations that must be resolved before the development of a SMART course is begun. The course designer will need to know the time available for the conduct of the course, the number of students expected (to determine whether small group activities can be supported), the media and methods available for use, and whether or not contingency or remedial activities will be supported.

Scheduling and pacing. Experience indicates that students should be required to spend from four to six hours per week doing learning activities plus two to three hours per week interacting with other students and performing course related administrative tasks such as uploading and downloading and sorting information. (See the In–Depth Look at Pacing and the discussion of Determination of a Course Schedule in Section B for more information.) On average, then, students should be expected to spend about eight hours per week on a SMART course.

Hence, the course schedule must be designed to accommodate this pace. Obviously, more calendar time must be allotted for SMART courses than for resident courses.

In addition, course schedules must be set so they can accommodate civilian responsibilities, other RC duties, travel, and holidays. Some "slack" time, over and above the eight hour per week requirement, is needed.

Externally imposed schedules seem to work best. Thus, courses should be lockstepped with definite milestones. Sanctions for not meeting those deadlines should also be set in advance and given to all participants. (For more on deadlines and sanctions, see the discussion on Administrative Considerations later in this section.)

One researcher has suggested that class size in a SMART environment be just slightly larger than the similar class in a resident school.

Supposedly, this will ensure a critical mass for successful student interaction.

For small group activities, a critical mass of 5–6 students is needed. Group size should not exceed 10–12 or else the discussion may become unwieldy and closure may not be reached.

For more information on group size, refer to the In–Depth look at Group Interaction in Section B.

Demographic survey. As students are being recruited for the course, basic demographic and background information (like that discussed in the Special Topic on Student Backgrounds) should be solicited. If available early enough, this information will be useful to the course designer in the analysis of the entry characteristics of the SMART students.

The information will also be invaluable to the SMART instructor when making class assignments and assessing potential weak areas that students might share. (See the Instructor Guide for more information on the use of background information in the SMART class.)

Class size. Classes that are structured with an instructor, a team leader, and administrative support for records keeping should be able to handle from 50–60 students. However, this number is highly speculative, and is dependent on the complexity of the subject matter and the types of learning activities selected. For example, highly technical material will probably involve more student–instructor interaction than will less technical material. Further, independent activities require less instructor time than group activities.

Variety of media. One of the most robust findings in the distance education literature is that *increasing the variety of media used in a course increases throughput.* Thus, in spite of the fact that some media may cost considerably more than others (for example, production of a storyboard costs two to three times what it would cost to produce the same content in paper format), a full range of media should be supported for any SMART course.

Further, the particular implementations of the media (i.e., a particular CAI authoring package) should be selected based on course requirements, more so than cost.

Group activities. Learner retention and motivation is aided when students interact. Although group activities are more expensive in terms of communications costs and require more calendar time to complete, they should be supported because of their positive impact on student retention.

SPECIAL TOPIC ON DEMOGRAPHIC SURVEYS: Collecting Student Background Data

Pencil and paper surveys of demographic information can be collected from students when they are being recruited for the course or immediately upon enrollment. This information will be helpful in determining the need for contingency activities, for diagnosis by the instructor in the event that a student is having problems, and as the basis for team member selections.

The following data should be collected:

Information	Potential Uses
Ratings of current skill on the topics to be taught in the course	Awareness of need for contingency activities for weak areas; team assignments
Ratings of current skill on peripheral topics, such as computer, mathematical, and problem solving skills that could affect course success	Awareness of need for remedial or contingency activities for weak areas; team assignments
Known times when the soldier will not be able to participate in the course	Administrative scheduling, such as setting of office hours and synchronous activities; course scheduling around holidays and annual training if most soldiers will be gone
Military and civilian job experience relevant to the course content	Determination of experience base to be called upon to fuel group discussions; team assignments
Military and civilian educational experience relevant to the course content	Determination of satisfaction of prerequisites; awareness of need for contingency or remedial activities in weak area; team assignments
Leadership positions (i.e., company command) held	Team assignments

Each block of instruction should begin with a group orientation activity and other group activities should be introduced throughout the course. (See the In–Depth Look at Group Interaction in Section B for more information).

Further, the break room concept which is described in Section A should be supported, because it serves to facilitate group interaction without the anxiety that is introduced when pressure to succeed in graded group exercises is experienced.

Support for contingency activities. Contingency activities are exercises which students complete if they fail primary instruction. The choice of whether or not to support such activities involves a trade–off between course development and instruction efforts. Courses with preplanned remediation ease the burden on instructors (since they do not have to develop remedial lessons on an ad hoc basis) and may allow a single instructor to handle larger class sizes. However, the development of pre–planned remedial activities increases the burden on the course developer.

In one experimental course, experience showed that the development of contingency activities for each primary instruction segment was not cost effective. Only about 11% of the contingency activities available were accessed. Some contingency activities, however, were very heavily used—up to 54% of the students used some of these activities, particularly those associated with difficult subjects.

Hence, if specific areas of difficulty can be identified in the analysis of the existing resident course and/or by collecting demographic data, planned contingency activities should be developed.

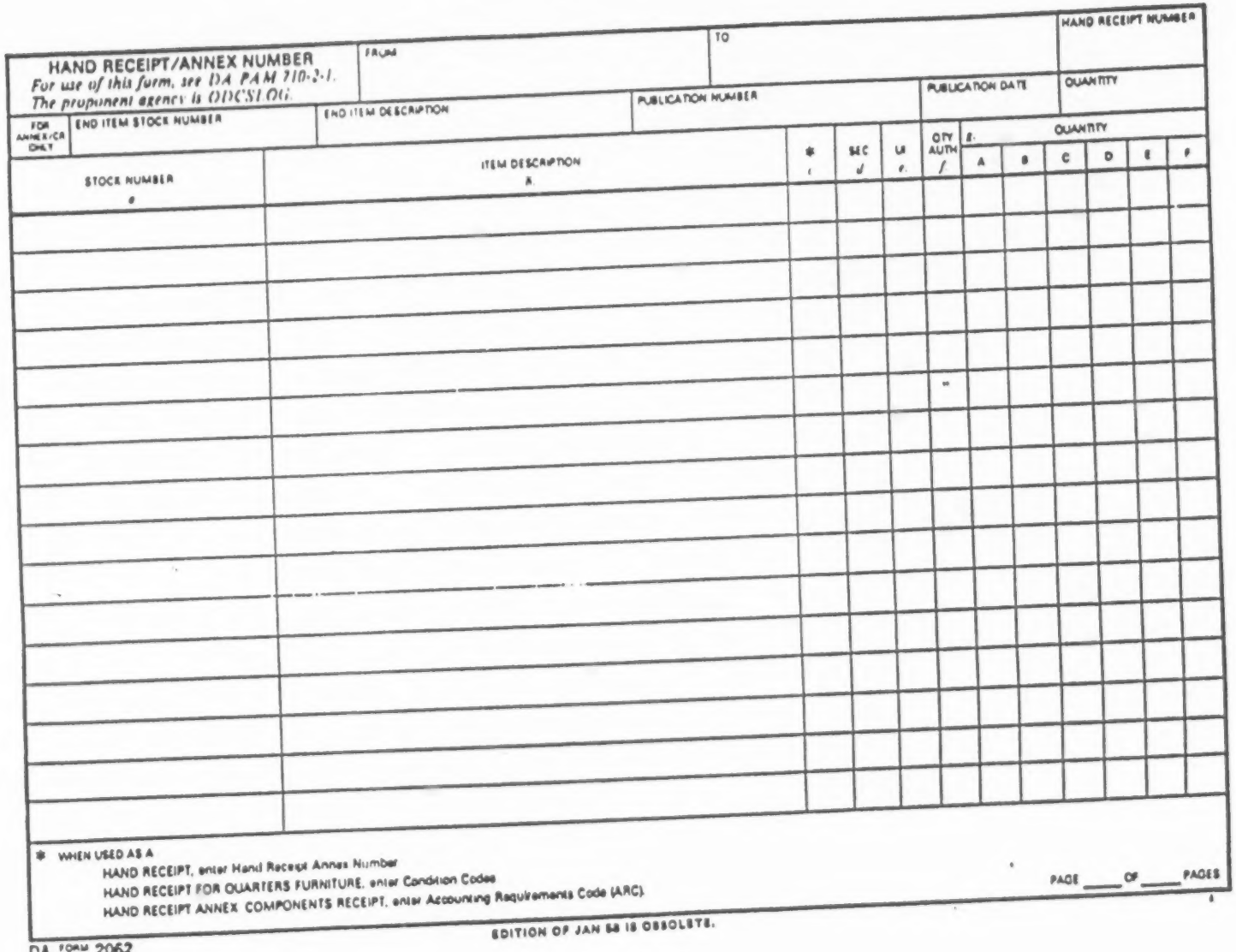
Administrative Considerations

In implementing a SMART course, there are a number of administrative matters that must be considered. Remember, it is frequently these small, mundane, seemingly inconsequential factors that determine the ultimate success or failure of a course.

Computer and material access. The literature on electronic education indicates that a lack of easy and direct access to a computer increases the dropout rate. Hence, each student should have a computer, preferably set up at home. The use of learning activities presented outside the home should be as limited as possible.

Shipping and return of computers. If the Army is providing students with equipment, constant tracking of the computers will be needed to prevent accidental loss or theft. Hand–receipts (such as DA Form 2062, shown at Figure 10) should always be required when shipping computer systems.

Also, computers must be shipped in such a way as to minimize damage. It is recommended that all computers be shipped via air services or be picked up directly by the



HAND RECEIPT/ANNEX NUMBER
For use of this form, see DA PAM 710-2-1.
The proponent agency is ODCSLOG.

FROM

TO

HAND RECEIPT NUMBER

PUBLICATION NUMBER

PUBLICATION DATE

QUANTITY

FOR ANNEX/CA ONLY

END ITEM STOCK NUMBER

END ITEM DESCRIPTION

STOCK NUMBER	ITEM DESCRIPTION	*	SEC	UI	QTY AUTH	QUANTITY					
						A	B	C	D	E	F

* WHEN USED AS A
HAND RECEIPT, enter Hand Receipt Annex Number
HAND RECEIPT FOR QUARTERS FURNITURE, enter Condition Codes
HAND RECEIPT ANNEX COMPONENTS RECEIPT, enter Accounting Requirements Code (ARC).

PAGE ____ OF ____ PAGES

DA FORM JAN 83 2062

EDITION OF JAN 58 IS OBSOLETE.

Figure 10. DA Form 2062 Hand Receipt.

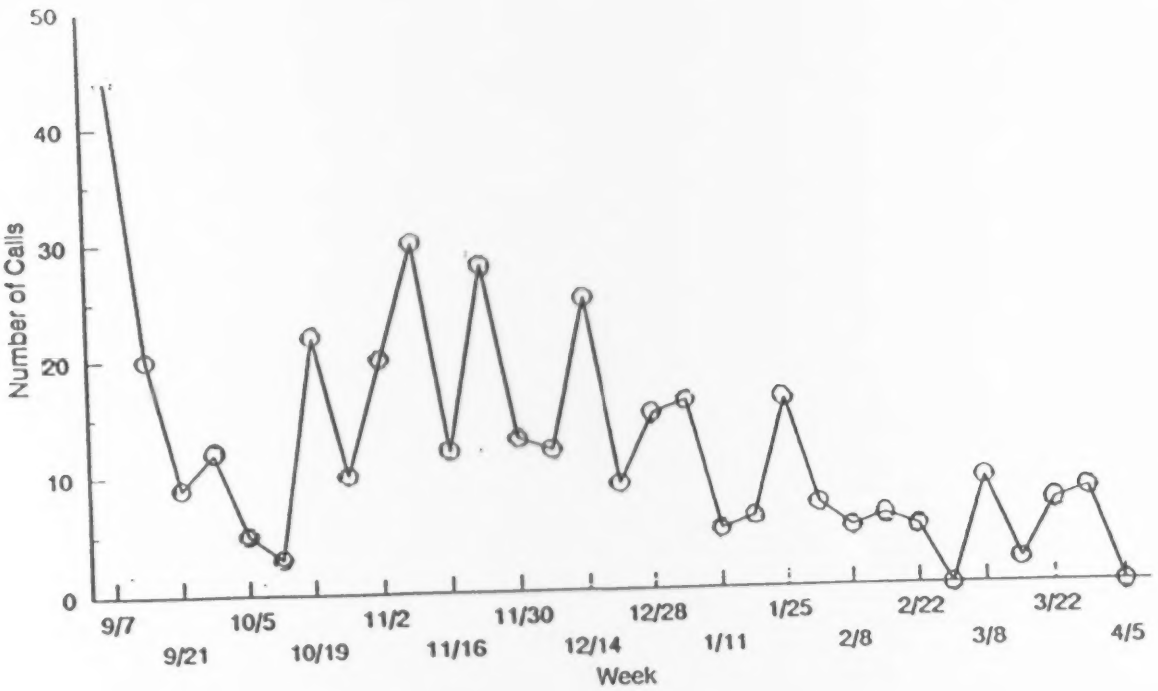


Figure 11. Telephone contact with instructor over the duration of a course.

Norms and rules. Students should be provided with class norms and rules at the outset of each SMART course. (See the previous discussion on student characteristics in this section for an example set of norms.) Grading and participation requirements should be thoroughly explained, as should the social etiquette of computer conferencing. (See the Instructor Guide for a discussion of online etiquette.)

A discussion of these matters at the beginning of a course can avoid messy and frustrating problems down the road. In addition, student participation in the development of norms can foster a sense of ownership in the course and enhance motivation.

Participation requirements. It is unclear how "participation" should be defined in the SMART environment. For example, are lurkers (individuals who only listen to discussions but do not communicate online) really participating?

Although this question is difficult to answer, it is clear that without some minimal level of participation, there will be no *conferencing* in the computer conference. A minimum requirement of signing on *two* times per week will help ensure steady progress towards deadlines and active group and individual participation.

It is important, however, not to sacrifice quality for quantity. If it appears that simple

recipient, if possible. Avoid using the U.S. mail system. Further, shipping boxes to be used for computer return should be provided to all. Otherwise, computers may be returned in damaged condition.

Assembly and installation instructions. Students entering a SMART course are not expected to be experts on hardware assembly. Thus, detailed instructions must be provided with each computer shipment.

- Cables and connections on computers and peripherals (monitors, printers, and the like) should be tagged with specific instructions for easy installation. Sample assembly instructions can be found in Appendix A at the end of this section.

- If software is to be installed on the computer by students, installation instructions must be provided.

- If software is pre-loaded on the computer prior to shipment, backup disks and installation instructions must be available in the event that the software does not operate satisfactorily.

Registration of students and funding of computer accounts. Students must be registered on conferencing systems prior to the course. Passwords for computer access must also be provided.

Sufficient computer funds must be provided for each student to fulfill course requirements. A mechanism must also be set up to add funds to computer accounts in case they become low. It is especially important to check all computer accounts prior to conducting any synchronous activity. This will ensure that students and instructors alike will have sufficient funds to participate in the activity.

Student support mechanisms. A telephone hotline must be provided to troubleshoot hardware and software problems. The hotline should be available during evening and weekend hours, since this is when students do most of their work. At the least, the hotline must be capable of taking messages on a 24 hour basis. Quick turnaround is needed for troubleshooting software and hardware problems. Without the use of a computer, students cannot participate in the course!

Although a hotline may at first appear to be a frivolous extra, it is actually a vital prerequisite for the successful execution of a SMART course. Doing without a hotline may well doom a SMART course, since students frustrated by computer problems are likely to drop out. Figure 11 shows that telephone contact is particularly heavy at the start of a course.

The U.S. mail can also be used to support a SMART course. Mailing course assignments and sending reminders to students who are not getting online are just a few examples of how the postal system may be used.

"verbiage" is being written to meet a participation requirement, then that requirement should be reevaluated. A lower minimal participation requirement may be needed, or, there may be a need for more interesting and challenging questions to be posed.

One alternative is to set standards solely on the basis of completion of requirements, not on amount of participation. This is easily accomplished with individual activities; either the students completed the activity, or they did not. Group requirements are more difficult and require a judgment on the part of the instructor or team leader as to whether students contributed enough to have satisfactorily completed the activity.

The In–Depth Look at Group Interaction in Section B gives more information on participation requirements.

Setting prerequisites. Grouping or "gating" of logical units of instruction containing several learning activities is commonly necessary. Grouping ensures that a student completes a required amount of course work before being allowed to proceed to another activity, such as an end of topic examination.

The actual grouping size is highly variable and is dependent on the nature of the material. For example, general material that is fairly simple would have fewer gates than material of a highly complex, technical nature. However, gating each individual learning activity should be avoided, because such actions do not allow enough flexibility for the course participant, especially if feedback on one activity must be received before another activity can be started.

Gates should always be used prior to exams to ensure that all prerequisite activities have been completed. Some activities, such as ongoing discussions, should not be gated. Rather, students should be able to access them any time they are working on a topic. Learning activities containing prerequisites should be gated such that they cannot be accessed until the prerequisite is completed.

One method to accomplish gating is to put each group of materials in its own protected file. In this way, the instructor can control access by issuing passwords only to those students who have successfully completed the prerequisites and are ready to undergo the next instructional sequence.

Testing. To ensure test security, all tests should be protected. Protection, in this case, means that the test cannot be printed and can be accessed only once during any course.

Additionally, students should be cautioned not to disclose test questions to anyone either inside or outside the course.

Although it is important to protect tests, no test security is absolutely foolproof. However, by taking precautions, the chances of a test being compromised are minimized.

Deadlines. To help ensure timely assignment completion, deadlines are needed for all

graded activities. Experience showed that deadlines were the single most effective way to keep the course moving at the desired pace. (See the discussion of course scheduling in Section B.)

Sanctions for failure to meet deadlines, such as not accepting late homework or giving only a maximum grade of 75 for late assignments, should be established at the outset of a SMART course. These sanctions should be similar to those used in resident school under similar circumstances.

All deadlines should be appropriately spaced to allow enough time to adequately complete an assignment, but not so much time that procrastination becomes a serious problem. A good rule of thumb is to have a deadline at one to tow week intervals, or at the end of each topic.

Extenuating circumstances may argue for relaxing the schedule for particular students. However, this should be done only if they will enter into a contract to catch up on the material at a later date, like that shown below. Extensions of deadlines for the class as a whole should be avoided if at all possible. Such actions have been shown not to produce substantial improvement in throughput.

Message from instructor:
"As we talked earlier, we have set up a schedule for your to catch up because of your many problems. You will be done with (topic) 10 by the 11th of February, done with 7 by the 28th of February, and done with 8 by the 13th of March."

Incentives. Grading policies which are similar to those used at the proponent school should be incorporated into any SMART course. Computer mediated activities, such as online small group exercises, should also be an integral part of the SMART student's grade.

Academic Efficiency Reports (AERs) can be given, if this is the policy of the proponent school.

Letters of commendation and/or letters introducing the program to student's commanders can also be used as incentives. Letters to the commanders may be useful in that, if commanders know of their soldiers' involvement in the course, they may not be as likely to impose additional reserve duties on them.

Finally, penalties for non-compliance with course requirements (i.e., disenrollment) should be instituted. These penalties should be consistent with the local policy of the proponent school.

We hope that this section has been useful in identifying areas you need to consider in implementing a SMART course. Section B may give you a further appreciation for pedagogical areas that require special attention in SMART.

APPENDIX A

SAMPLE ASSEMBLY INSTRUCTIONS

Welcome to Phase _____, EOAC.

****

PLEASE GO THROUGH THE ATTACHED STEP–BY–STEP CHECKLIST. AS YOU ARE DOING SO, PLEASE CONFIRM THAT EACH SERIAL NO. ON THE HAND RECEIPT ENCLOSED IS CORRECT. IF THE SERIAL NOS. DO NOT MATCH, PLEASE CALL (AREA CODE) XXX–XXXX.

****

****

PLEASE CONFIRM THAT EACH ITEM ON THE HAND RECEIPT HAS BEEN RECEIVED AND IS NOT DAMAGED.

****

****

PLEASE RETURN THE HAND RECEIPT, AFTER YOU HAVE CONFIRMED THE INFORMATION LISTED, TO:

In the enclosed self–addressed, stamped envelope.

****

QUESTIONS – If you have any questions, please feel free to call the "hot line" XXX–XXX–XXXX. You may use the calling card No. _____. THIS CALLING CARD NUMBER IS TO BE USED ONLY TO CALL THE "HOT LINE"!!

The "hot line" is generally manned between the hours of 8:00 a.m. and 5:00 p.m. MST. An answering machine will be used by the "hot line" personnel when they are unavailable. If you get the answering machine, please leave your name and a phone number where you can be reached in the evening and during the day, and also a brief description of the problem you are having or the question you need answered. Someone will get back to you as soon as possible.

Save All Packaging Materials for Return Shipping When This Training is Complete. (Boxes, Foam, etc.)

Please keep the plastic cover on the keyboard whenever it is not in use. This will protect it against spills and dust.

If you are doing any repairs or have a particularly dusty environment, please cover the monitor with a clean towel when it is not in use.

Please follow the attached step–by–step instructions for assembling your PC.

ASSEMBLE TABLE FIRST

Tools Required: Phillips head screwdriver and 3/8" wrench.

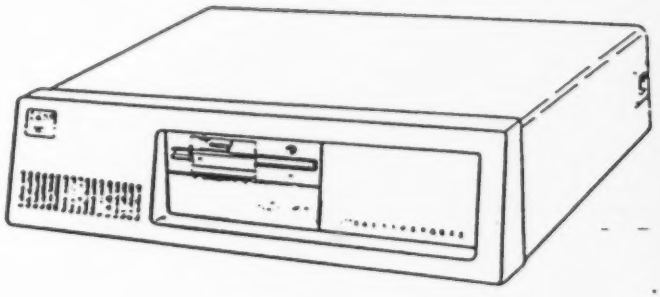
_____ Put the table in a convenient location which is safe, accessible to the phone and an electrical outlet. Please follow the directions outlined on the Lit-Ning Value Group Workstation instructions enclosed in the computer table box.

INSTRUCTIONS TO ASSEMBLE PC

All of your internal options have already been installed on this XT and checked out. You will not need to open the computer unit or make any hardware switch changes. Please check off steps as completed. You will notice that each plug has a number.

1. IBM XT SYSTEM UNIT

_____ Open box marked "IBM XT Personal Computer".
Included in the box are:
_____ IBM XT system unit
_____ key to system
_____ black power cord
_____ 5' phone cord
_____ 25' phone cord
_____ 6 outlet surge protector
_____ 5 formatted disks and labels (for use in backing up files)
_____ Course materials (to be used later as directed)
_____ DOS 3.1 Operating System documentation and disk (already loaded)
_____ IBM Typing Tutor documentation and disk (already loaded)
_____ IBM "Guide to Operations" reference manual (Tutorial already loaded)
_____ Leading Edge Word Processor Manual and disks and upgrade disks (all disks are already loaded)



98

_____ Place the system unit on the computer table you have received.

_____ Please check the serial No. of the system unit, located on the back (right hand corner looking at the system from the back) of the system unit to confirm it matches the serial No. on your hand receipt. If it does not match, please call the "hot line" number listed above, after you have completed assembling all the equipment.

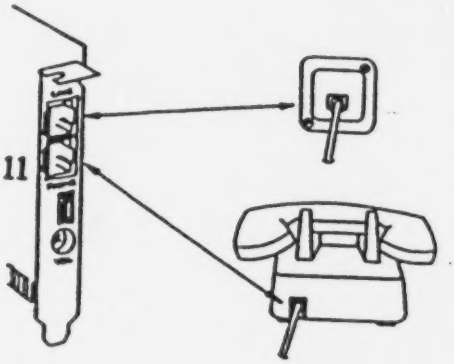
_____ Plug surge protector into a wall socket nearest your computer. Make sure the surge protector light is off.

_____ Plug the black power cord (#1) into the back of your system unit indicated by #1. Plug the other end into the surge protector (#2).

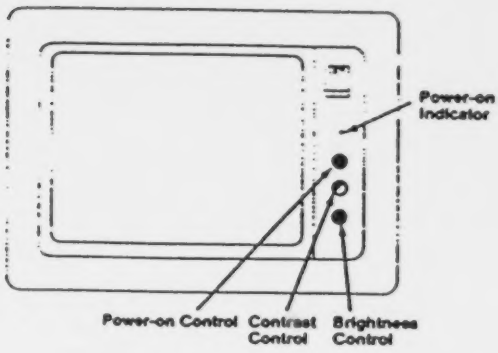
_____ Plug the 5' (or 25', whichever you need) phone cord end labeled #11 into the back of the system unit (#11).

_____ Plug the other end of the phone cord into the back of your phone. (Should you not have a modular phone jack, you will need to obtain an adapter to allow you to use a standard jack).

_____ Plug the original phone cord (from the wall) into the back of the system above #11 where labeled LINE. (You may find the 25' cord helpful here.)



2. IBM ENHANCED COLOR DISPLAY



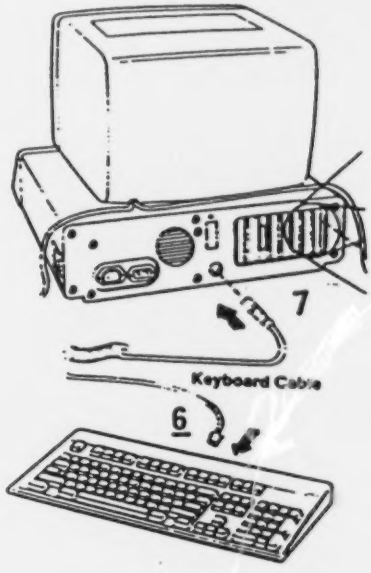
_____ Open box marked "IBM Enhanced Color Display" (Monitor). Remove monitor and cable from the box. Place monitor on top of system unit.

_____ Please check the serial No. located on the back (center) of the monitor to confirm the No. matches the No. on your hand receipt. If it does not match, please call the "hot line" number listed above, after completing assembly.

_____ Screw in cable end labeled #3 into the back of the system unit (#3).

_____ Plug in power cord end labeled #4 into the back of monitor (#4). Plug other end into surge protector (#5).

3. IBM KEYBOARD



_____ Open box marked "IBM Keyboard". Remove keyboard and cord. Place on computer table.

_____ Please check the ID No. located on the bottom (center) of the keyboard to confirm the No. matches the No. on your hand receipt. If it does not match, please call "hot line" number listed above, after completion of assembly.

_____ Snap cord end labeled #6 into the back of the keyboard (#6), and plug in the other end (#7) into the back of the system unit (#7).

4. EPSON FX-85 PRINTER AND STAND

_____ Open box marked printer stand. You will find a stand and paper included in the box.

_____ Place the stand in a convenient location near your system unit.

_____ Place the paper under the stand and feed up through slot in stand with paper coming out toward the back of the stand.

_____ Open box marked "Epson FX-85 Printer". Remove printer, paper separator, paper feed knob, extra lid for use with optional accessories, ribbon cartridge, and "User's Manual" and label for type of print desired.

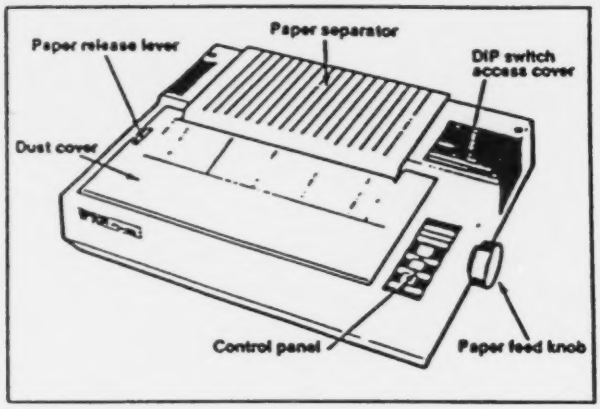
_____ Please check the serial No. on the back (right) side (looking at it from the back) to confirm No. matches the No. on your hand receipt. If it does not match, please call the "hot line" number listed above, after completion of assembly.

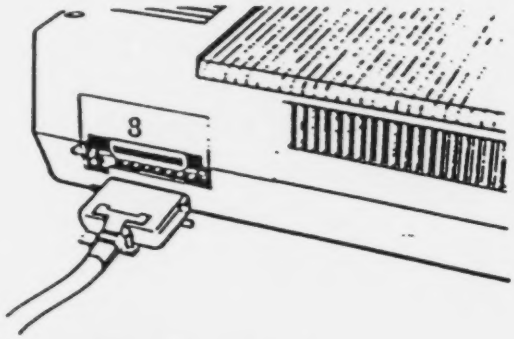
_____ Place the printer on top of the stand toward the front of the printer stand so the paper can easily feed into your printer.

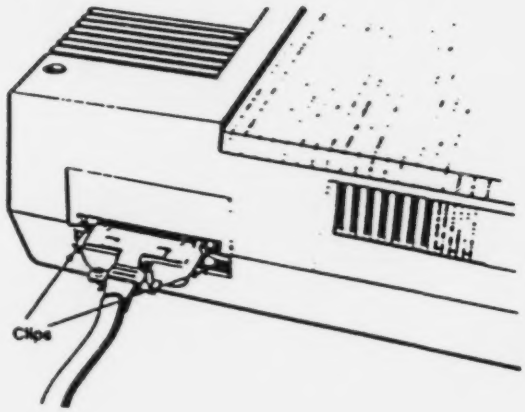
_____ Snap cable end labeled #8 into the back of the printer (#8), and screw the other end (#9) into the back of the system unit (#9).

_____ Plug the power cord (#10) into the surge protector (#10).

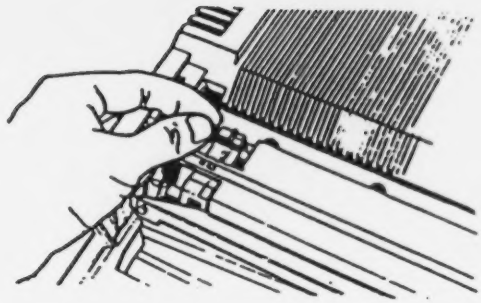
_____ Put the paper feed knob on the right side of the printer.







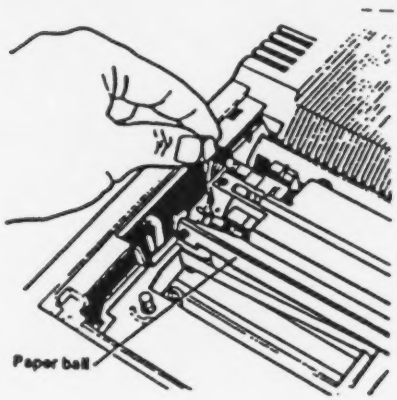
_____ To put paper in your printer, adjust pin-feed holders, pull forward on the gray locking levers, and slide the holders so that the black arrows point to 9.5. To lock the pin-feed holders, push back the gray levers. See Epson User's Manual pages 11 and 12 if further help is needed.



_____ Move the print head to the center of the printer and pull the paper bail away from the platen, pull the paper release lever forward.

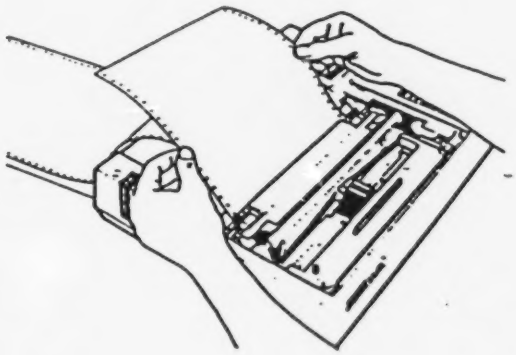
_____ Make sure the paper's leading edge is free of wrinkles or tears. (You may want to feed a folded edge - 2 sheets in at once.)

_____ Slide the paper evenly into the paper slot (from the back of the printer) until it stops, keeping it aligned with the outside edges of the black pin-feed holders.

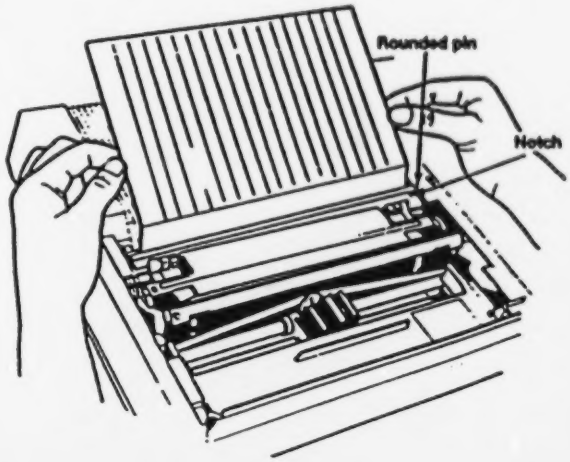


_____ Slowly turn the paper feed knob until you feel the paper catch and start to be pulled through; evenly.

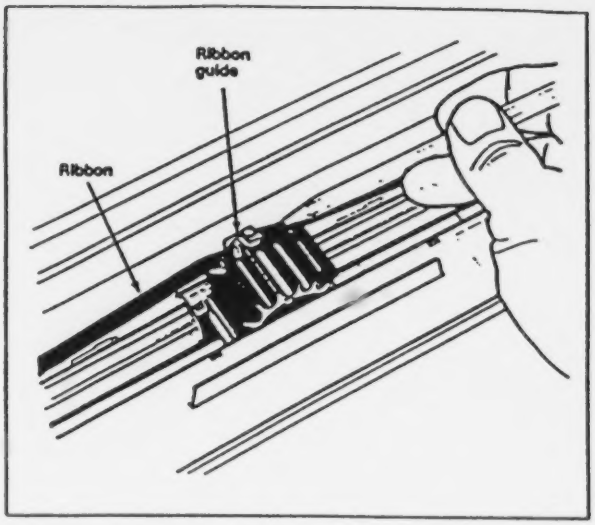
_____ Continue turning the paper feed knob until the paper appears above the paper bail. Push the paper bail back against the paper. Set the pin-feed holders for 9.5. Leave the print head in the middle of the platen.



_____ Attach the plastic paper separator. The separator has rounded pins on each end that fit into the notches located just behind the pin feed. See Epson User's Manual page 14.



_____ Install the ribbon. Before loading the cartridge into the printer, turn the small knob on top of the ribbon cartridge in the direction of the arrow to tighten the ribbon. (See the Epson User's Manual, pages 6, 7, & 8 for further details).

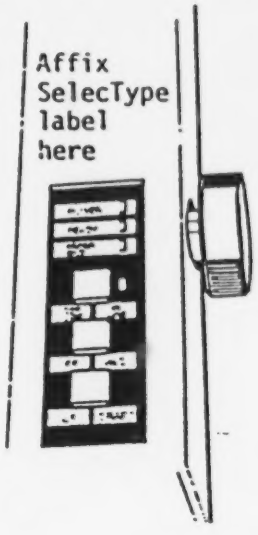


_____ Hold the ribbon cartridge by the raised plastic "fin" on top of the cartridge case. Lower the cartridge into the printer, guiding the two square pins on each end of the cartridge into the slots in the printer frame. Press firmly on each end of the cartridge to make sure the pins are firmly seated in the slots.

_____ The ribbon should slide between the silver ribbon guide and the print head. If it doesn't, you can guide the ribbon into place using the point of a pencil.

_____ Take off the white cover and snap the dust cover in the same place the white cover was located.

_____ Affix the SelecType label above the control panel.

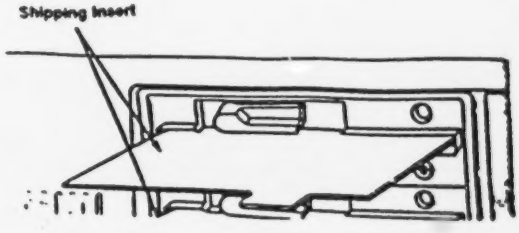


5. START UP

_____ Turn on surge protector (light will go on).

_____ Open drive A: (the slot on the left side of the front of system unit)

_____ Remove white card (head protection card for transporting) from drive A: SAVE THIS CARD WITH YOUR PACKING MATERIALS.



_____ Leave drive A: open.

_____ Turn on system unit key (right side, rear).

_____ Turn on monitor (top knob, front).

_____ Switch on printer (left side).

The Army Teleconferencing Tutorials Master Directory screen will appear.

At the bottom of the screen you will see the prompt:

C:\USER>

_____ Enter your time of day on your system.

At the C:\USER> prompt type: time XX:XX

Your screen will look like the following example:

```
C:\USER>time 12:15
```

Press the ENTER key.

If at any time you want to return to the menu screen from any prompt, type: menu

Your screen will look like the following example:

```
C:\USER>menu
```

Press the ENTER key.

The Army Teleconferencing Tutorials Menu will appear on your screen.

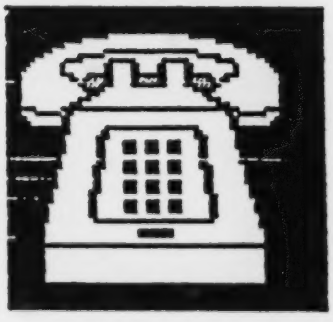
```
                ARMY TELECONFERENCING TUTORIALS
                     MASTER DIRECTORY

TYPE:

   ATC         --->  ATC communications system
   ATCTutor    --->  ATC Tutorial
   IBMtutor    --->  Explore the IBM PT  (Produced by IBM)
                       WARNING: You will have to turn off computer
                                to get out of this tutorial.
   Overview    --->  Overview of entire project
   SD          --->  Shutdown the computer
   TypTutor    --->  Typing Tutor
                       WARNING: You will have to turn off computer
                                to get out of this tutorial.
   WP          --->  Leading Edge word processor
   WPTutor     --->  Leading Edge word processor tutorial

C:\USER>
```

Now that you have completed assembly of your PC and table, give us a call on the "hot line" both so you can see how it works, and so that we can know that everything is fine. We are waiting for your call.



208-526-9403

The system is completely configured including much of the software you will be using. Additional software, (the project overview and communications software) as well as additional training materials, are being sent to you.

Perhaps the first software you run should be the IBM Tutor (IBMTutor) "Exploring Your IBM XT". Also you will find a copy of the Epson "User's Manual" located in the box with your Epson FX-85 printer.

If you require operating instructions, you will find a copy of the IBM "Guide to Operations" reference manual located in the box with your IBM XT system unit.